THE TAMILNADU DR.M.G.R.MEDICAL UNIVERSITY

VALUE OF ROUTINE FOLLOWUP CT BRAIN AT 24 AND 48 HOURS IN MILD AND MODERATE HEAD INJURY PATINTS

Dissertation submitted in partial fulfillment of the requirements for the degree of

M.Ch. Branch –II
NEUROSURGERY

Examination in AUGUST 2013

INSTITUTE OF NEUROLOGY

MADRAS MEDICAL COLLEGE

CHENNAI – 3.

CERTIFICATE

This is to certify that the dissertation entitled is "VALUE OF ROUTINE FOLLOWUP CT BRAIN AT 24 AND 48 HOURS IN MILD AND MODERATE HEAD INJURY PATINTS" the bonafide original work of Dr.A.SURESHKUMAR in partial fulfillment of the requirements for Branch II, M.Ch Neurosurgery, examination of THE TAMILNADU DR.M.G.R MEDICAL UNIVERSITY to be held in August 2013.The period of post graduate study and training was from August 2010 – August 2013.

DEAN
Madras Medical College,
Rajiv Gandhi Government
General Hospital,
Chennai -3.

PROF. K.DEIVEEGAN, MCh
Professor and HOD,
Institute of Neurology,
Madras Medical College,
Rajiv Gandhi Government
General Hospital,
Chennai – 3.

DECLARATION

I solemnly declare that this dissertation **"VALUE OF ROUTINE FOLLOWUP CT BRAIN AT 24 AND 48 HOURS IN MILD AND MODERATE HEAD INJURY PATINTS"** was prepared by me in the Institute of Neurology, Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai under the guidance and supervision of Professor of Neurosurgery, Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai between 2010 and 2013.

This dissertation is submitted to The Tamilnadu Dr.M.G.R. Medical University, Chennai in partial and fulfillment of the university requirements for the award of degree of M.Ch. Neurosurgery.

Place: Chennai

Date :

DR.A.SURESH KUMAR,
Postgraduate Student,
M.Ch Neurosurgery,
Institute of Neurology,
Madras Medical College,
Chennai – 3.

ACKNOWLEDGEMENTS

I thank the Dean, Madras Medical College and Rajiv Gandhi Government General Hospital - RGGGH for permitting to carry out this study and also for providing necessary facilities.

I thank my teachers Prof.K.Deiveegan, Prof.K.Maheshwar, Prof.S.D.Subbiah, Prof.Ranganathan jothi, Prof.Jagan Narayana , Prof.S.Syamala, and Prof.V.Sundar, Prof.VG.Ramesh and Prof.S.Sundaram under whom I had great privilege of working as a postgraduate student receiving their constant advice and valuable guidance. I thank my professors towards their immense support and encouragement in preparing this dissertation.

I am profoundly thankful to Prof.K.Deiveegan , professor in Neurosurgery, who initiated this study and who's supervision this study went on smoothly.

My sincere thanks and gratitude to all my Assistant Professors of Neurosurgery for their guidance and co-operation throughout this study. I thank all my Patients and their relatives for participating in the study.

CONTENTS

	Page no
1. Introduction	1
2. Aim of the study	4
3. Review of literature	5
4. Materials and methods	20
5. Results	29
6. Discussion	54
7. Conclusion	68
8. Proforma	69
9. Bibliography	73
10. Master chart	78

INTRODUCTION

INTRODUCTION

Traumatic brain injury is defined as Brain damage resulting from external forces, as a result of direct impact, acceleration or deceleration force, injury due to motor vehicle accident, penetrating object including gunshot wound, or blast wound from explosion.

Classification of traumatic brain injury

The **Glasgow Coma Scale** or **GCS** is a neurological scale that helps in objective way of recording the conscious state of a person for initial as well as subsequent assessment. A patient is assessed with three criteria of the scale, eye opening, verbal response, motor response and the final points give a patient score between 3 (deeply unconsciousness)to 15(fully oriented state)

The maximum score is 15 and minimum is three

Generally, brain injury is classified based on GCS SCORE as:

- Severe, with GCS < 9
- Moderate, GCS 9–12
- Mild, GCS ≥ 13.

In current neurological modern era computed tomography is most essential tool in diagnosing and managing head injury CT scanning—also called as CAT scanning[4] is a noninvasive test that helps neurosurgeons diagnose and treat surgical conditions .CT scanning combines the use of special x-ray equipment with sophisticated computers to produce multiple images and pictures of the inside of the body (brain). These cross-sectional images of the area needed to be studied can then be viewed on a computer monitor, or printed to a CD.

CT scanning is a cost effective tool in diagnosing and following up head injury patient and generally a follow-up CT scan done when there is signs and symptoms of clinical deterioration or when there is fall in GCS score by >2.

Though there are various guidelines formulated for the follow-up and ICP monitoring for severe head injury patient no such things exist for the mild and moderate head injury patient's. It is so important that patient should be intervened at the earliest stage before further clinical deterioration, which will reduce the mortality and morbidity to a greater extent. The purpose of the study is to evaluate the prognostic importance of serial follow up CT scan and to analyze any change

in size of lesion, any new lesion detected, any change in the treatment protocol in asymptomatic patients in mild and moderate head injury patients.

Having known about traumatic brain injury, its effect on socio economic status and CT scan being cost effective and highly sensitive and specific in preventing and minimizing the mortality, morbidity in head injury patients and to serve their family with good quality of life and socioeconomic status this study on **VALUE OF ROUTINE FOLLOW-UP CT BRAIN IN MILD AND MODERATE HEAD INJURY PATIENTS** who are clinically stable was done.

AIM OF THE STUDY

AIM OF THE STUDY

- To assess the role of routine follow-up CT Brain at 24hours and 48 hours in clinically stable mild and moderate head injury patients.
- To evaluate any change in the finding compared to initial CT
- To detect any new lesion ,change in the size of lesion(enlarging or resolving)
- To analyze any change in the modality of treatment either medically or surgically based on finding on follow up CT in head injury patients who didn't showed any clinical deterioration
- To analyze the final outcome in these patients.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Management of head injury is one of the difficult issues. Since head injury is one of the leading causes of mortality and morbidity and a major socioeconomic contributor in developing country a lot of care should be taken in improving the standard of care and follow-up and management in these patients.

Traumatic brain injury is assessed using GLASGOW COMA SCALE. GCS score was used to assess level of consciousness after injury. The scale was published in 1974 by Graham Teasdale and Bryan J. Jennett, professors of neurosurgery at the University of Glasgow's Institute of Neurological Sciences at the city's Southern General Hospital.

Glasgow Coma Scale

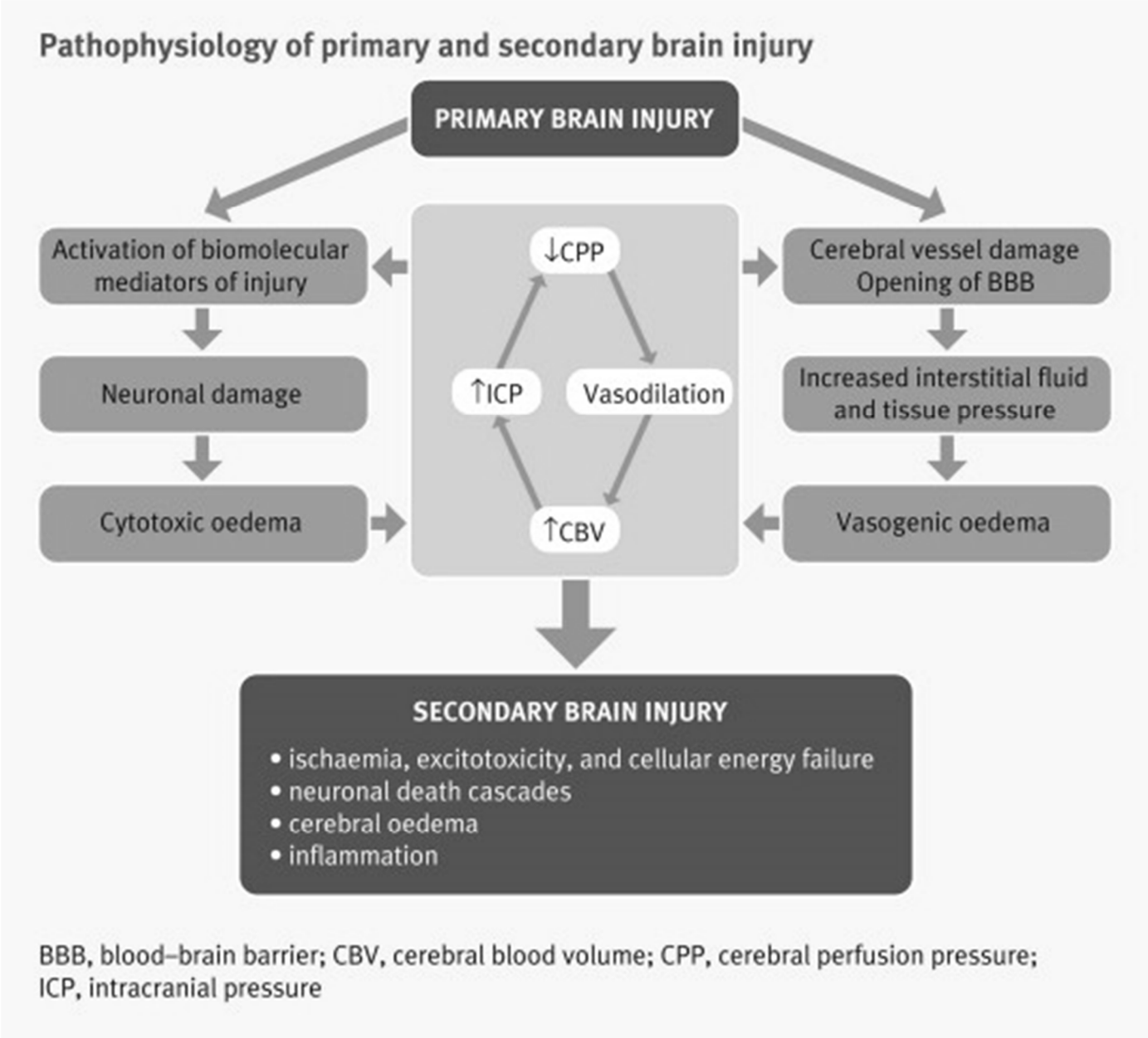
Best eye response (E)	Spontaneous--open with blinking at baseline	4
	Opens to verbal command, speech, or shout	3
	Opens to pain, not applied to face	2
	None	1
Best verbal response (V)	Oriented	5
	Confused conversation, but able to answer questions	4
	Inappropriate responses, words discernible	3
	Incomprehensible speech	2
	None	1
Best motor response (M)	Obeys commands for movement	6
	Purposeful movement to painful stimulus	5
	Withdraws from pain	4
	Abnormal (spastic) flexion, decorticate posture	3
	Extensor (rigid) response, decerebrate posture	2
	None	1

CT scanning has revolutionized in diagnosing and subsequent follow-up and management of head injury patient .there are certain guidelines formulated like the Canadian guidelines by Haydel et al for the indication of CT scanning in head injury patient but there are no guidelines formulated till date for the serial follow-up CT scanning.

The effect of head injury to brain is primary and secondary. The impact of primary injury is detected by the initial CT scanning which is usually done within hours in most countries and patients are treated accordingly. All severe head

injury patients are managed in intensive care unit and followed up with ICP monitoring and serial follow-up CT scanning if warranted.

The monitoring and follow-up of the mild and moderate head injury patient is more problematic then the severe head injury patient .First they constitute the majority of the head injury patient constituting more than 80%.Secondly in developing countries like India intensive care monitoring is not feasible to all these patients .. Third though they appear to be clinically stable a substantial proportion of patients shows increase in size of lesion, rebleed, brain edema and subsequent raise in intracranial pressure and midline shift and acute clinical deterioration.



Though majority of these patient show some signs and symptom of clinical deterioration an urgent CT scanning done and they are intervened but a substantial

proportion of mild and moderate head injury patients are clinically stable and show acute deterioration as a result of secondary changes in brain injury.

Earlier diagnosis and prompt intervention can be possible in these patients if they are subjected to serial follow-up CT scanning even if they are clinically stable so that secondary changes happening in brain can be followed up and necessary intervention can be taken before they deteriorate.

Lee et al[10] did his work on **Follow-up computerized tomography (CT) scans in moderate and severe head injuries: correlation with Glasgow Coma Scores (GCS), and complication rate** in 1997.It is a retrospective study were he analyzed the medical records of 180 patients with blunt head injury Only patients (117) with severe, moderate head injuries were included in the study. A total of 319 follow-up brains CT's for ninety four patients were obtained. In his study of 71 cases, Repeat scan showed increase in size of contusion in 31 cases (44.0%), no change in size in 28 cases (40.0%) and decrease in size in 12 cases (16.0%). The cause for increase was mainly due to edema in 20 cases (64.0%) but due to actual increase in primary contusion in only 11 cases (35.0%). Only 5 (7.0%) cases needed change in management in the form of operative intervention.

Tabori , Uri ,Korneki et al [24] in their study on **Repeat computed tomographic scan within 24-48 hours of admission in children with moderate and severe head trauma** in the year 2000 reported that 47 (27%) cases of the second CT scans showed significant new lesions including six intracranial hemorrhages (ICH), 17 cases showed worsening of brain edema, and 18 cases showed newly diagnosed brain contusions, and there was no change in modality of management. Of the 67 patients in the study group who underwent a third CT, two cases resulted in surgical intervention because of new findings in the third CT scan. They concluded that a second prescheduled routine CT scan done within the first 24-36 hours after head injury in children with moderate-to-severe head injury is important for knowing the dynamics and the morphologic changes but is unlikely to result in any changes in the modality of treatment. Monitoring clinically and ICP-oriented CT may better select and diagnose patients who may require changes in mode of management including surgery. The best timing for routine repeat CT scanning in patients who do not significantly improve is unknown.

Brown ,Carlos, Daniel, Rhee et al [2,3,1] in their study in the year 2003- **Did Routine Serial Computed Tomography of the Head Influence Management of**

Traumatic Brain Injury? In their prospective study they concluded that, doing Serial head CT is common after head injury. Most of repeat head CT scans were performed on a routine basis without any neurologic change. Few of these patients with TBI have their management altered after taking repeat head CT, and these patients have some sort of neurologic deterioration before the repeat head CT. The routine use of serial head CT in patients without any neurologic deterioration is not supported by this study.

[4] Bruce lee and Andrew Newberg et al in their study on **Neuroimaging in Traumatic Brain Imaging** in the year 2005, cited that in the management of head trauma, imaging has several important roles: identifying the postoperative and neurophysiologic sequelae, evaluating the functional outcome and abnormalities associated with the late complications of head trauma, predicting the long-term prognosis, and guiding rehabilitation, and developing strategies for new therapies to prevent secondary injury. They concluded that in the future, there will be a significant role played by CT imaging in guiding therapy in head injury and will continue to influence therapy and may improve the outcome in head injury patient for what is a significant health care problem.

Majorie, C.Wingemen F Linnau, William Hollingsworth[25] et al **Utility of repeat head computed tomography after blunt head trauma:** a systematic review.(2006) cited there was Progression of injury on repeat CT which was evident in 8 to 67% of the patients in the study. Neurosurgical intervention as a result of subsequent repeat CT occurred in 0 to 54% of patients. More severe traumatic brain injury was associated with a higher incidence of patients with progression of injury on CT imaging and leading to subsequent neurosurgical interventions. .and they concluded that: indications for repeat CT scanning after traumatic brain injury is unclear. The wide range of injury progression on CT imaging and resulting changes in surgical and medical treatment suggest that there may be a subset of patients who will definitely benefit from repeat CT. Further research should stratify the severity of traumatic brain injury and to, clearly define the inclusion and exclusion criteria, and to address the selection bias.

Roka and Bista et al[15] in their study on **Role of repeat CT scan head in initially inoperable Cases of traumatic head injury** in their study on 71 cases (M: 48; 68.0% and F:23; 32.0%)with traumatic head injury admitted and managed conservatively in the National Neurosurgical Referral Centre starting from May 2005 to April 2006. concluded that routine use of repeat CT scan in mild to

moderate head injury patients has no role unless if there is any clinical deterioration.

Ashraf Shafirudeen[1], Johari Anon ,Abdul Kani et al in their study **The Role of Repeat Head Computed Tomography in The Management of Mild Traumatic Brain Injury Patients with a Positive Initial Head CT** in the year 2008-2009 studied 279 MTBI patients in the neurosurgical unit out of which 26patient had a GCS score of 13 (9.3%), 46 patient had a GCS 14 (16.5%) and 207 patient had a GCS of 15 (74.2%). 135 patients with solitary lesion was noted in the initial scan, 22 (16.4%) SDH, 16 (11.6%) EDH, 55(40.8%) contusions and 42 (31.2%) had SAH. There was also 92patients who had base of skull fracture and 102patienrts with convexity fracture. All the patients were subjected to repeat CT and they showed improvements of the lesion in 45 patients (16.1%), no change in size in 176 patients (63.1%), and increase in size in58 patients (20.8%). Surgical intervention was done in 31 patients following the repeat CT. They finally concluded that routine use of repeat head CT scan in mild head injury patients with a non-operable lesion in initial head CT scan should be abandoned, it should be used only in a subset of cases having the risk factors associated with an increased risk of evolution of the intracranial pathology. Decreasing the ordering

of additional CT will result in the decrease hospital costs, and decreased staff and patient exposure to the radiation

Malachi and Juven et al[11] in their study **Repeat cranial tomography in patients with mild head injury and stable neurological examination** - a perspective from a developing country was a cross-sectional study and was done in the Department of Radiology, Liquate National Hospital, Karachi during time period January 2008 to September 2010. They included 275 patients with mild head injury who underwent repeat CT scans without any clinical or neurological status of deterioration in the emergency department, of these 275 patients, only 17 (6%) of them were found to have finding worsening on repeat CT scan , 120 (43.63%)scans showed improved results , 138 cases (50.18%) unchanged and 17 (6.18%) cases worsened. None of these patients during the admission showed signs of clinical deterioration. They concluded that for patients with mild head injury and with stable neurological condition on examination, only 6% of the cases showed deterioration on repeat CT scan , especially when patients' GCS is below 13.so they concluded that repeat CT scan without any signs of clinical

deterioration have some value in moderate head injury then in mild head injury patients .

Fig, Ryan and Todd et al[7] in their study on **Clinical Efficacy of Serial Computed Tomographic Scanning in Severe Closed Head Injury Patients** concluded that in severe head-injury patients who are non - neurosurgical candidates on the basis of findings in the initial and repeat CT scans, serial head CT scans has little clinical value in the alteration in the course of management.

Sifri,Ziyad, Nyak et al[20] in their study- **Clinical Efficacy of Serial Computed Topographic Scanning in Severe Closed Head Injury Patients** concluded that in severe head-injury patients who were non-neurosurgical candidates on the basis of initial(first)CT and repeat CT scans, serial CT scans have little clinical efficacy in changing mode of treatment and do not lead to urgent surgical intervention.

Ramesh[13] ,Sunil, Paramjeet Singh et al in their study **Role of repeat CT scans in the management of traumatic brain injury** in the year2012. In this study a total of 201 patients of traumatic head injury were followed with serial CT

scans and maximum of up to 5 scans were done. Progression of the lesion was noted in most of the in patients with mixed lesions, multiple lesions (21.8%). New lesions were noted in 5.5% of patients at the CT-2 (2^{nd} serial CT) and in 5.8% at CT-3(3^{rd} serial CT). Out of the total 201 patients, 47 patients (23%) had some sort of change in management.

In 26 (55%) cases the decisions of change in management were based upon the clinical deterioration and remaining 21cases (45%) upon radiological changes only. A greater incidence of surgical intervention was seen in the patients who had their first CT scan done within 6 hour of initial trauma. However, few cases in whom the first CT scan was done 6 hours after the trauma as well as in some patients in whom the CT scan was repeated as a routine procedure without any signs of clinical deterioration also had change in their management an increased incidence of surgical intervention was noted in patients who had their first CT scan within 6 hours of initial trauma and they were clinically stable.

Therefore, it was suggested that in patients who had their first CT scan done within 6 hours of the trauma, the second CT scan can be done earlier, within the 12 hours of trauma rather than the recommended period of 24 hours. Also, the

incidence of neurosurgical intervention was found to be higher when the repeat CT scan was done following clinical deterioration than when it was done as a case of routine protocol. Similar finding were also reported by Yamaki et al. and Servadai et al. However, it should be recognized that there was a significant proportion of patients in whom a CT scan done after 6 hours of trauma who had to undergo surgical intervention after the second CT scan. Similarly there were also patients in whom a repeat CT done as a routine procedure without any change in the neurological status led to significant changes in the management, including surgical intervention Therefore, if one have done a repeat CT scan purely on the basis of the clinical deterioration of the patient, there are chances of missing the potentially curable lesion changes.

The alteration in the management decision, based upon the repeat CT scan, may not always be surgical. It may also be medical. Expansion (increase in size) of or development of a new lesion in CT without any neurological deterioration, may warrant addition of decongestants, anti-edema to reduce intracranial pressure, shifting to an ICU or alteration of ventilator settings. Waiting to start these measures till there is a clinical deterioration may be detrimental at least in some of the patients. This can be avoided to a greater extent by a protocol of routine CT. Most evolutionary changes in the lesions were detected in the first 48 hours, and in

a small percentage of cases, even after that period. It would be reasonable to conclude to have repeat CT scans in all the head injury patients up to this time period and to be selective at a later period of time. They concluded that repeat CT scans were found to be of great value in detecting the new lesions and enlargement (increase in size) of existing lesions resulting in the change of management in a significant number of patients.

Saleh,Lulia, et al in their study **The Value of Scheduled Repeat Cranial Computed Tomography After Mild Head Injury** concluded that in the absence of any class1 evidence and supporting data, the value of routine follow-up CT scan imaging is questionable given the associated increase in the cost and associated risks inherent to radiation.

GLASGOW OUTCOME SCALE

The final outcome of patients with head injury is assessed by GLASGOW OUTCOME SCALE. The Glasgow Outcome Score applies to head injury patients the objective assessment of their recovery in five different categories.

1. Death	Severe injury or death without recovery of consciousness
2. Persistent vegetative state	Severe damage with prolonged state of unresponsiveness and a lack of higher mental functions
3. Severe disability	Severe injury with permanent need for help with daily living
4. Moderate disability	No need for assistance in everyday life, employment is possible but may require special equipment.
5. Low disability	Light damage with minor neurological and psychological deficits.

MATERIALS AND METHODS

MATERIALS AND METHODS

HOSPITAL SETUP

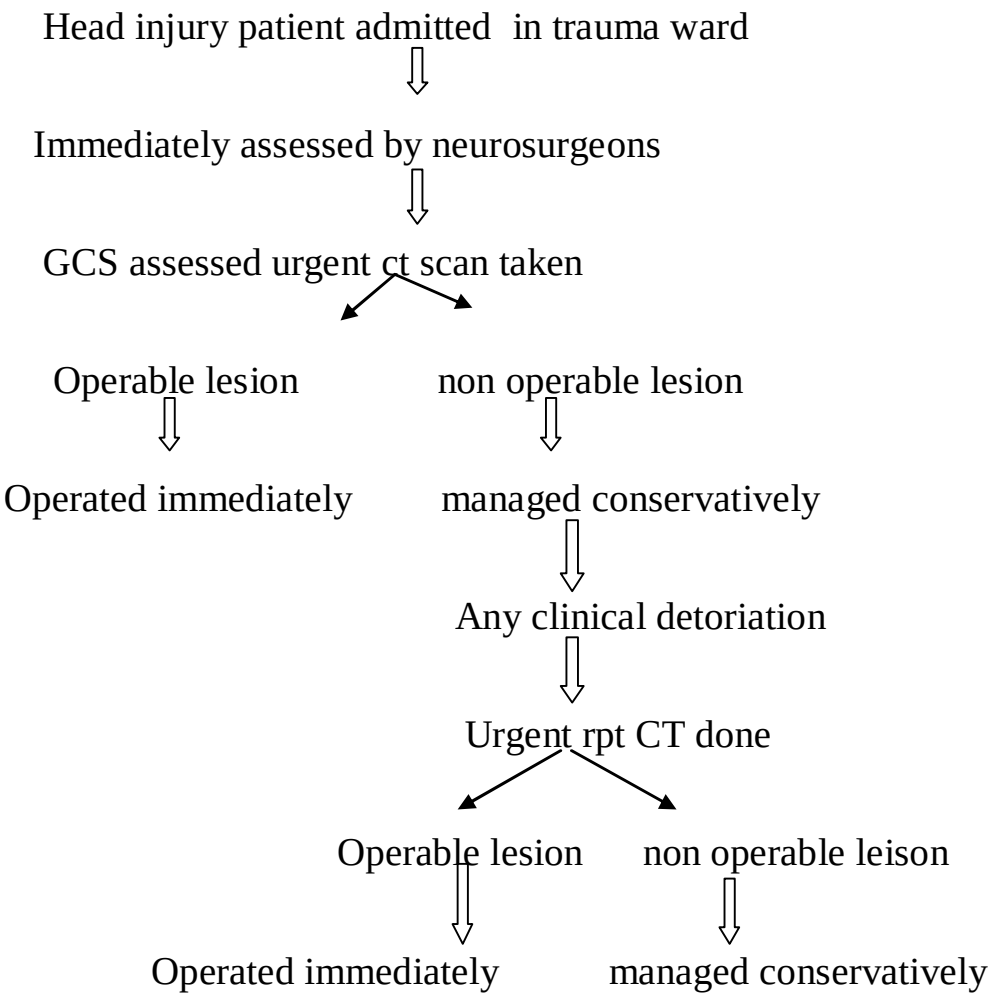
This study was conducted at RAJIV GANDHI GOVERNMENT GENERAL HOSPITAL, Chennai .Tamil Nadu, one of the most renowned hospitals in India and our neurosurgical department MADRAS INSTITUTE OF NEUROLOGY is one of the pioneers in the establishment of neurosurgical center in our nation.

Our government general hospital is a tertiary care referral center located in the Center of capital city, with a trauma ward where all the trauma cases including the head injury and polytrauma patients are admitted by the casualty medical officer.

All head injury cases were examined immediately by the duty neurosurgery residents and by the duty assistant neurosurgeon who gives 24 hour round the clock trauma care to Neuro trauma patients.

All the head injury patients are clinically assessed by ABCD method and specifically clinical and neurological status are assessed by applying GCS score. The vital parameters are closely monitored and after hemodynamic stability patient immediately shifted to CT (computed tomography) head scan.

PROTOCOLS FOLLOWED IN HEAD INJURY WARD

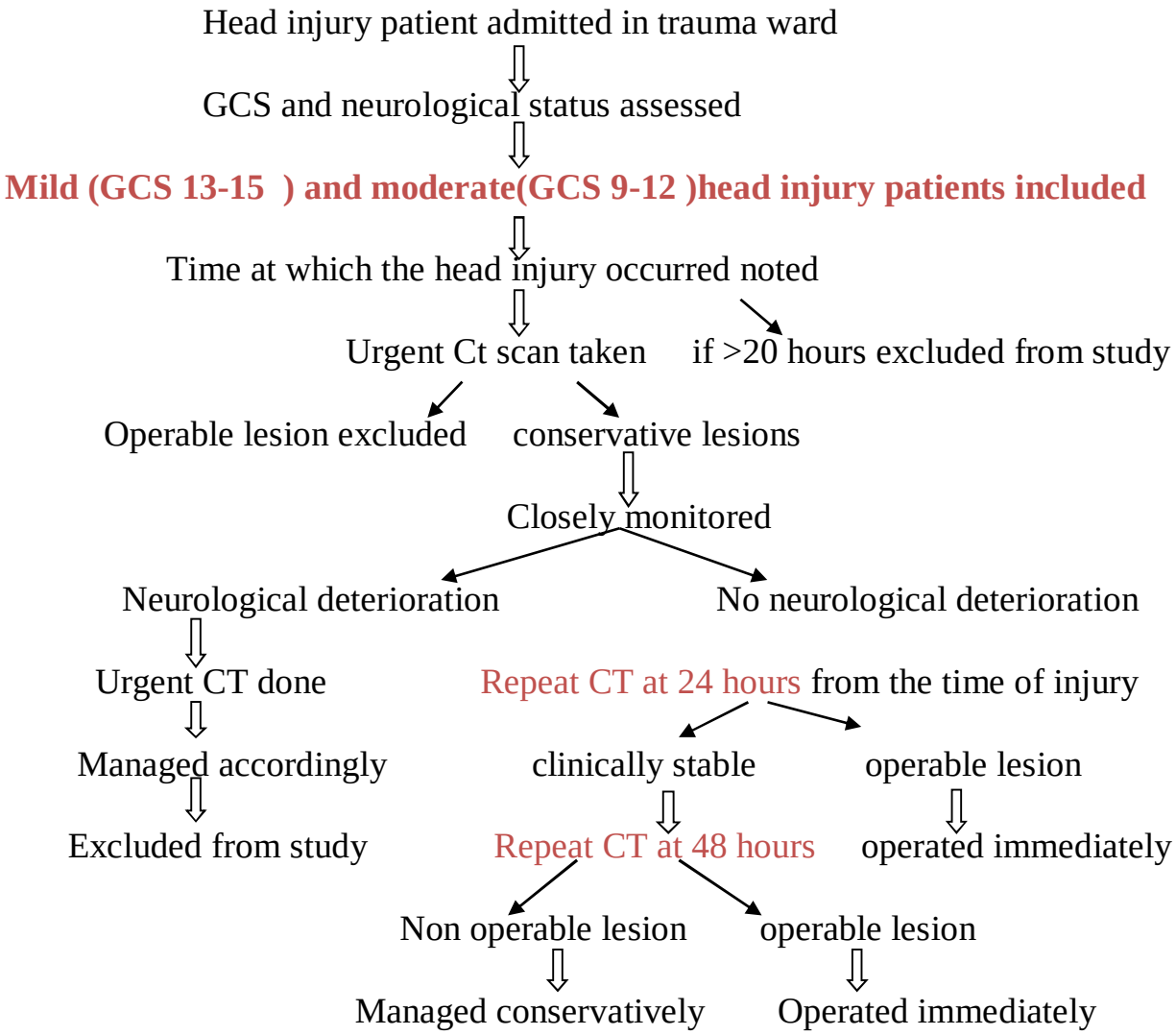


This is the flowchart model of the procedure followed in the head injury ward

STUDY PATTERN

- This is a prospective type of study.
- 350 CONSECUTIVE patients with mild (GCS13-15) and moderate head injuries (GCS9-12) admitted in emergency head injury ward in MIN were studied with follow-up CT Brain taken at 24hours and 48hours after the time of head injury.
- All the head injury patients are clinically assessed by ABCD method and their clinical and neurological status assessed and GCS score assessed
- ***All these patients didn't deteriorate clinically during the study period and there were no signs of raised ICP.***
- 48hours CT Brain was not done for patients who were operated based on 24 hour CT Brain.
- Any signs of neurological deterioration in between 24-48 hours urgent CT done and excluded from study
- After 48 hours repeat CT done only in patient showing neurological deterioration

PROTOCOL FOLLOWED IN THE STUDY



- **All Adult head injury patients with GCS 9 & above admitted during the study period were included.**

FOLLOWING PATIENTS ARE EXCLUDED FROM THE STUDY

- Patients with bleeding diathesis and other medical problems(liver failure, renal failure)
- Surgically treated patients
- Pediatric patients
- Patients who showed clinical evidence of deterioration during the study period were excluded.
- Patient with other severe systemic injuries
- Patient brought with > 20 hours of injury without initial CT
- Admitted under the influence of alcohol with or without CT finding and patient recovered completely before repeat CT scan

Study patients underwent routine clinical examination and followed up for clinical signs of neurological deterioration as follows

- Sudden and severe headache
- Increased restlessness or agitation
- Nausea and vomiting
- Decrease in GCS

- Motor weakness
- Signs of meningeal irritation
- Changes in the hemodynamic status such as increase in systolic blood pressure with a widening pulse pressure, changes in heart rate (bradycardia) or respiratory rate (increased, or decreased), or a change in the pattern of respirations (hyperventilation or irregular). These are often late signs of increased intracranial pressure.
- Pupillary changes such as size discrepancy, shape change, decreased reactivity. .
- Visual disturbances
- Cranial Nerve Palsy
- Sensory dysfunction
- Changes in Level of Consciousness

After doing initial CT and routine follow-up CT brain in clinically stable patients, some patients underwent surgery were with the following criteria

- Acute SDH of > 1cm thickness
- EDH of >2cm thickness and >30cc volume supratentorially and >15cc volume infratentorially
- ICH of >30cc volume
- Any lesion with midline shift of >5mm

CT scan brain, the commonly used investigation in head trauma patients, was the routine investigation for this study period and the positive CT findings noted are -

- FRACTURES
- EXTRADURAL HEMATOMA(EDH)
- SUBDURAL HEMATOMA(SDH)
- SUBARACHNOID HAEMORRHAGE(SAH)
- INTRACEREBRAL HAEMORRHAGE(ICH)
- CONTUSIONS
- PNEUMOCEPHALUS
- INTRAVENTRICULAR HAEMORRHAGE(IVH)
- DIFFUSE AXONAL INJURY(DAI)
- MIXED/MULTIPLE LEISONS

In this study the selected 350 patients underwent repeat CT scanning at 24 and 48 hours .At the time of discharge all patients were assessed as per GOS.

THE FOLLOWING FACTORS WERE STUDIED AND ANALYZED BOTH STATISTICALLY AND DESCRIPTIVELY WHETHER THEY COULD SERVE AS POSITIVE PREDICTIVE FACTORS IN THE MANAGEMENT MODALITY OF HEAD INJURY PATIENT (MILD AND MODERATE)

- Demographic data

  a. Age

  b. Sex

- Mode of injury
- Time interval between injury and first CT SCAN
- Findings noted in

  A) First CT

  b) First Repeat CT at 24 hours.

  c) Second Repeat CT in 48 hours.

Intervention and outcome profiles studied and analyzed

- Admission GCS
- Any neurological deterioration
- Any increase in size of lesion
- Any new lesion detected
- Any decrease in size of lesion
- No of cases showing no changes in repeat CT
- Any change in mode of management
- Intervention performed medical/surgical
- Final outcome using Glasgow outcome scale(GOS)

STATISTICAL ANALYSIS

The collected data was analyzed statistically by, applying the following:

- Mean
- Median
- Percentage
- Standard deviation
- Valid percentage
- Cumulative percentage
- Positive predictive value(P value),Chi-square test

RESULTS

RESULTS

The collected data of 350 patients were analyzed as follows

1) AGE DISTRIBUTION

AGE	NO OF PATIENTS	PERCENTAGE
10-20	13	3.71
20-30	106	30.29
30-40	138	39.43
40-50	49	14.00
50-60	16	4.57
60-70	317	4.86
70-80	11	3.10
TOTAL	350	100%

TABLE 1: AGE DISTRIBUTION

In the Age distribution of 350 patients, majority of the patient belonged to fourth decade followed by third decade

AGE DISTRIBUTION

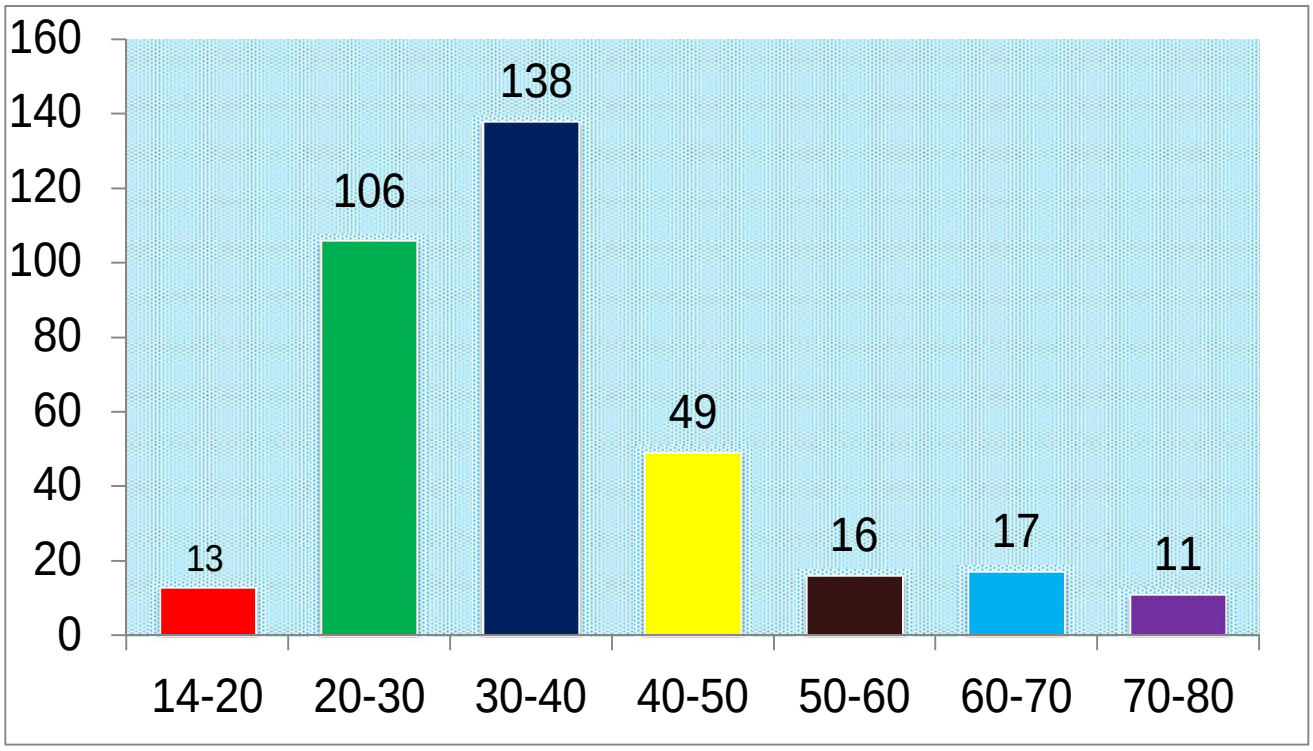


CHART 1: AGE DISTRIBUTION

2) SEX DISTRIBUTION

SEX	TOTAL NO OF PATIENTS	PERCENTAGE
MALE	281	80.21
FEMALE	69	`19.79
TOTAL	350	100%

Table 2: Sex distribution

Males contributed the majority in the study group.

CHART: 2 SEX DISTRIBUTION

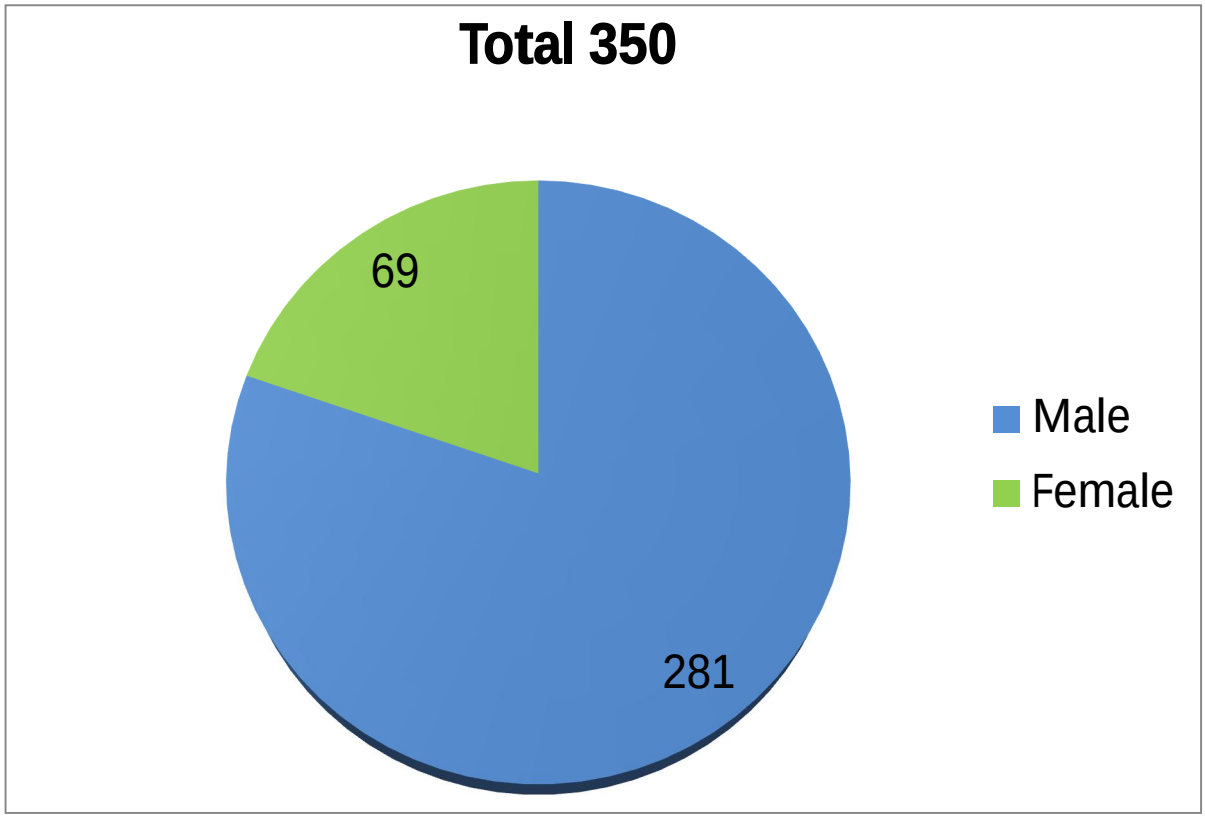


TABLE 3: STATISTICAL ANALYSIS OF SEX

		Frequency	Percentage	Valid %	Cumulative%	P value
Valid	Male	281	80.3%	80.3%	80.3%	
	Female	69	19.7%	19.7%	100%	**<0.001****
	Total	350	100%	100%		

Above table shows analysis of sex distribution.

3) MODE OF INJURY

MODE OF INJURY	NO OF PATIENTS	PERCENTAGE
RTA	286	81.71
FALL	47	13.43
ASSAULT	17	4.86
TOTAL	350	100%

Table 4: MODE OF INJURY

286 patients met with Road traffic accident in this study group followed by injury due to fall and assault

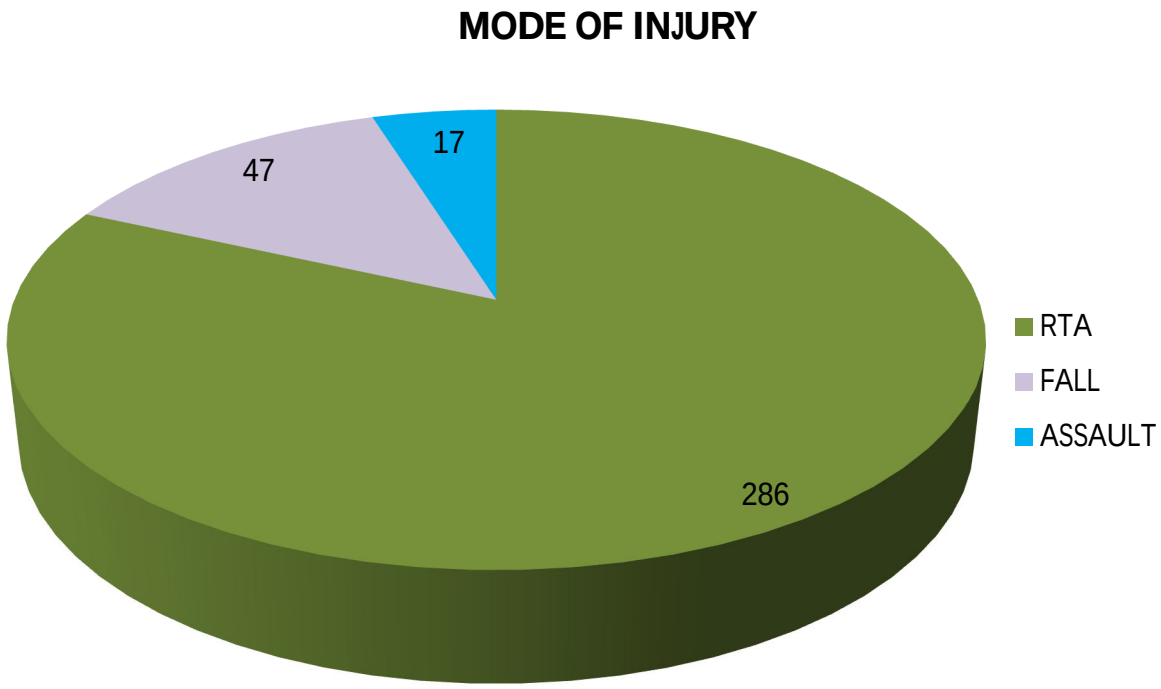


CHART 3: MODE OF INJURY

4) GCS

GCS GRADE	TOTAL NO OF PT	PERCENTAGE
MILD(13-15)	266	76
MODERATE(9-12)	84	24
TOTAL	350	100%

TABLE5: GCS

Applying the GCS scoring, mild head injury patients formed the majority group as shown in table. Moderately injured patients were 24%.

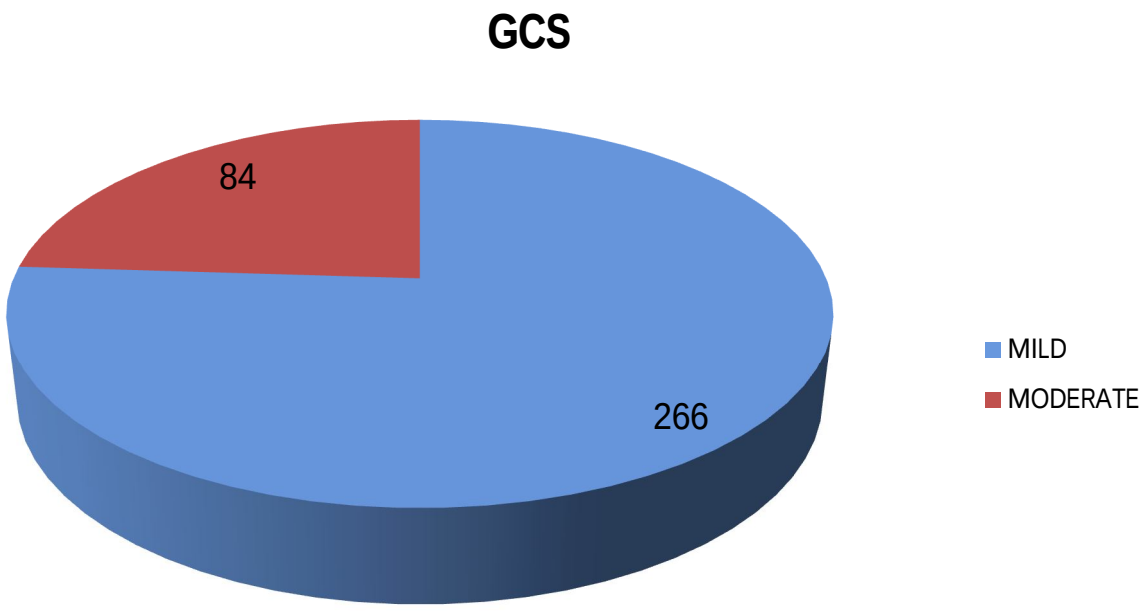


Chart 4: GCS

5) TIME INTERVAL

The time at which initial CT scan was done after admission was analyzed

TIME INTERVAL	NO OF PATIENTS	PERCENTAGE
O-4 HOURS	158	45.14
4-8 HOURS	181	51.71
8-12 HOURS	7	2
>12 HOURS	4	1.14
TOTAL	350	

Table 6: Time interval between injury and CT

Majority of the patients took their first CT scan within eight hours from the time of injury as highlighted in the table

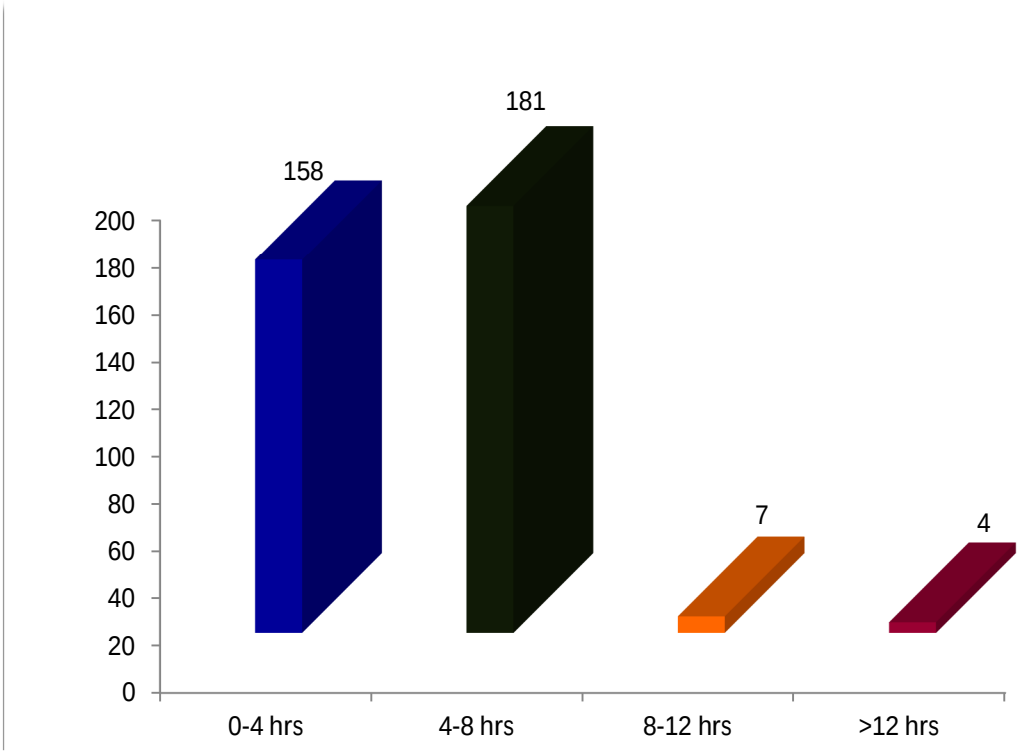


Chart 5: Time interval between injury and CT

TABLE 7: DESCRIPTIVE ANALYSIS OF AGE, GCS, TIME INTERVAL

	N	*Minimum*	*Maximum*	*Mean*	*Std. Deviation*
Age in years	350	17	78	36.14	13.195
GCS	350	9	15	13.31	1.503
TIME BET INJURY AND CT IN HOURS	350	2	14	5.22	1.831

- In the descriptive analysis the minimum age is 17 and maximum is 78 years in the study group
- Minimum GCS is 9 and maximum is 15
- The minimum time interval at which CT scan done is 2hours and maximum is 14 hours

6) FINDINGS IN INITIAL CT AFTER INJURY

FINDINGS	TOTAL	PERCENTAGE
CONTUSION	125	35.7
MULTIPLE	87	24.9
SDH	38	10.8
EDH	23	6.6
DAI	18	5.1
FRACTURE	22	6.3
SAH	22	6.3
ICH	9	2.6
IVH	6	1.7
TOTAL	350	100%

Table 8: Findings in initial CT (1st CT after injury)

Contusions are the common finding noted in the initial/first CT scan followed by mixed/multiple lesions

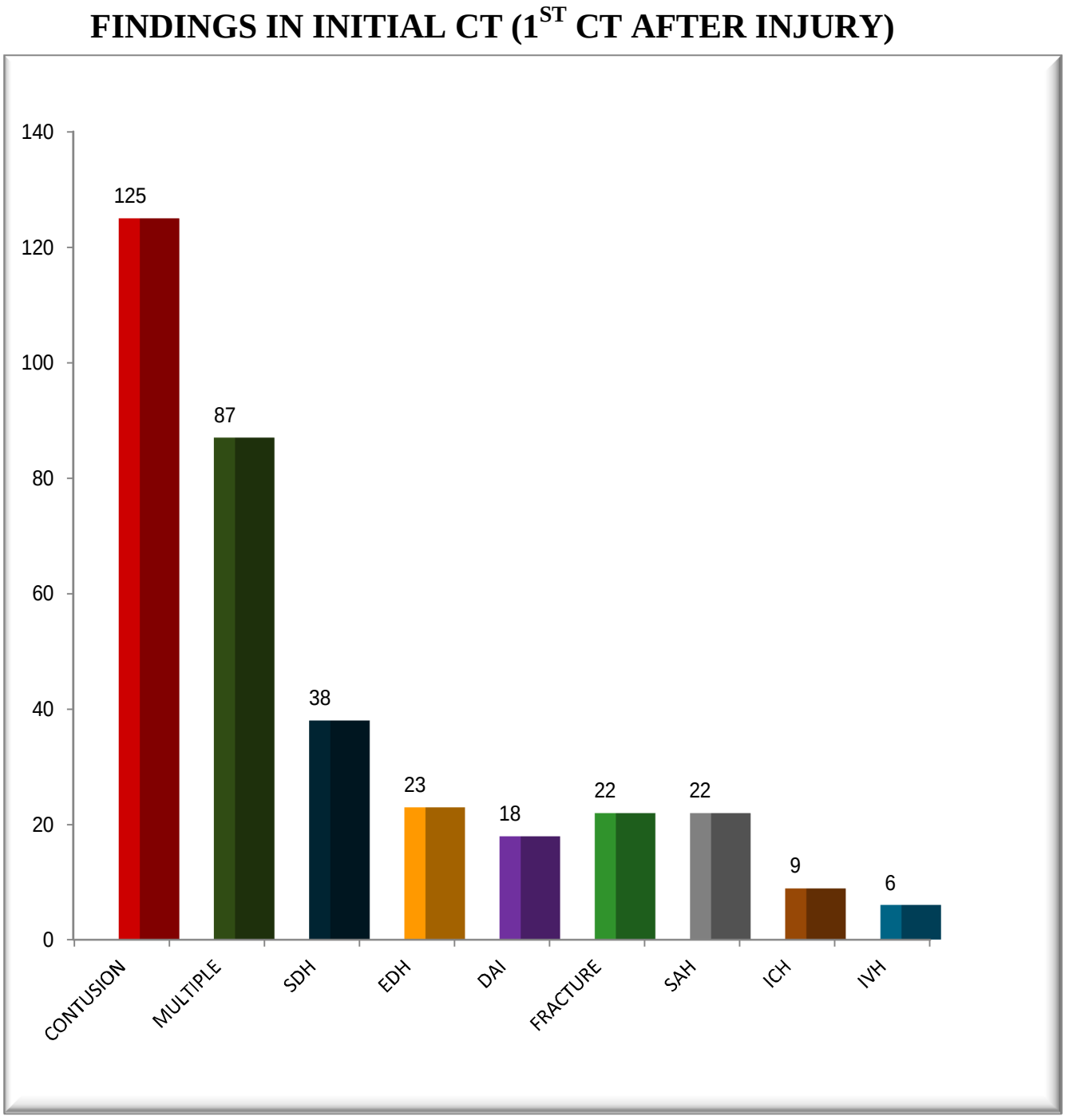


Chart 6: Findings in initial CT (1st CT after injury)

7) CHANGES IN FIRST REPEAT CT BRAIN AT 24 HOURS

CHANGE IN CT AT 24HR	NO OF PATIENTS	PERCENTAGE
NEW LESION	12	3.43
ENLARGING LESION	26	7.42
RESOLVING LESION	159	45.43
SAME SIZE OF LESION	153	43.71
TOTAL	350	100%

TABLE 9: CHANGES IH REPEAT CT AT 24HOURS

In the first repeat CT at 24 hours majority showed decrease in size of lesion followed by no change.

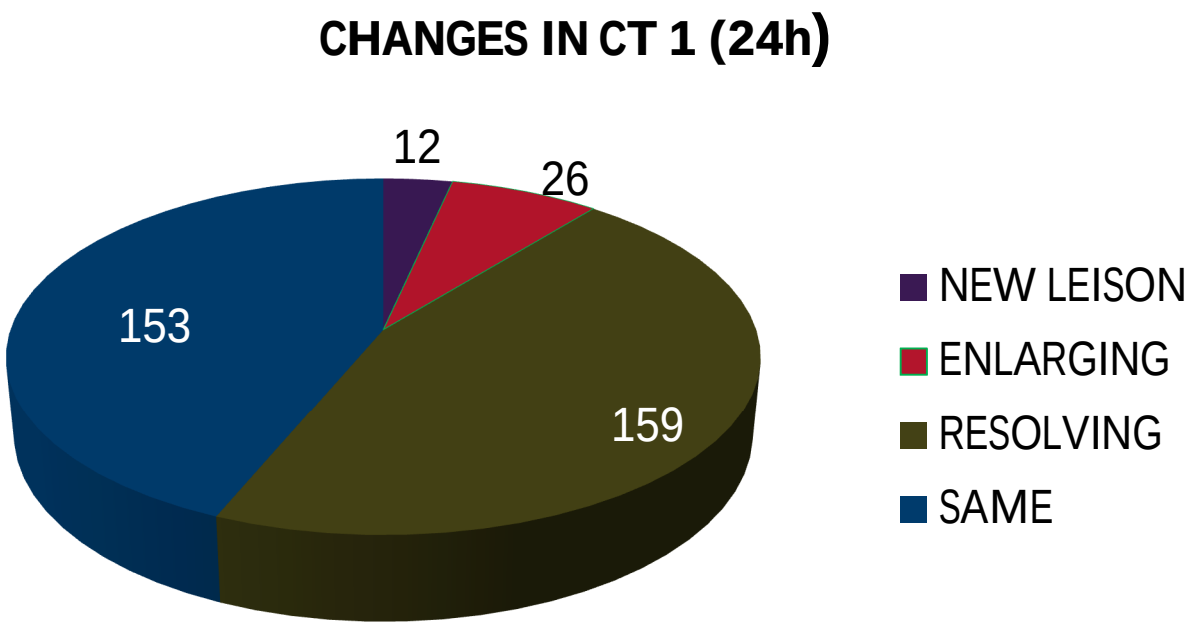


Chart 7: CHANGES IH REPEAT CT AT 24HOURS

TABLE 10: STATISTICAL ANALYSIS OF 24 HOUR CT BRAIN

		Frequency	Percent	Valid Percent	Cumulative Percent	P value
Valid	Enlarging	26	7.4	7.4	7.4	
	Resolving	159	45.1	45.1	52.6	
	Same	153	43.7	43.7	96.3	**<0.001****
	New lesion	12	3.7	3.7	100.0	
	Total	350	100.0	100.0		

Above table shows the statistical analysis of 24 hour CT brain

8) CHANGES IN SECOND REPEAT CT BRAIN AT 48 HOURS

CHANGE IN CT AT 48 HOURS	**NO OF PATIENTS**	**PERCENTAGE**
NEW LESIONS	NIL	0
ENLARGING LESIONS	7	2.08
RESOLVING LESIONS	70	2O.83
SAME	259	77.08
TOTAL	336	100%

TABLE11: CHANGES IN REPEAT CT AT 48 HOURS

***FOR 14 CASES REPREAT CT AT 48 HOURS NOT DONE**

Majority of patients showed no change in repeat CT at 48 hours followed by decrease in size of lesion

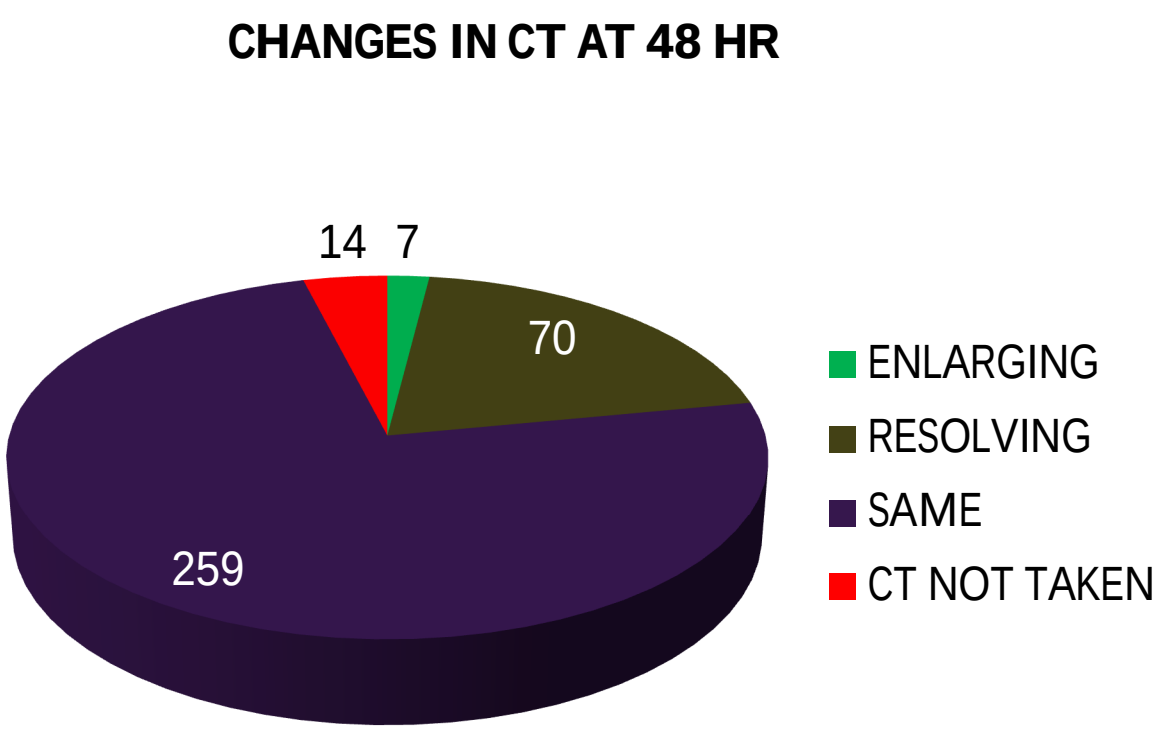


CHART 8: CHANGES IH REPEAT CT AT 48 HOURS

TABLE 12: STATISTICAL ANALYSIS OF 48 HOUR CT BRAIN

		Frequency	Percent	Valid Percent	Cumulative Percent	P value
Valid	Enlarging	7	2.0	2.1	2.1	
	Resolving	70	20.0	20.8	22.9	
	Same	259	74.0	77.1	100.0	**<0.001****
	Total	336	96.0	100.0		
Missing	System	14	4.0			
Total		350	100.0			

Above table shows the statistical analysis of 48 hour CT brain

9) SURGICAL MANAGEMENT IN ENLARGING LEISON IN CT

ENLARGING LEISON	NO OF PATIENTS	PERCENTAGE
CONSERVATIVE	16	53.33
SURGICAL	14	46.67
TOTAL	30	100%

Table 13: Enlarging lesions

Of the thirty cases that showed increase in size of existing lesions 14 cases underwent surgery

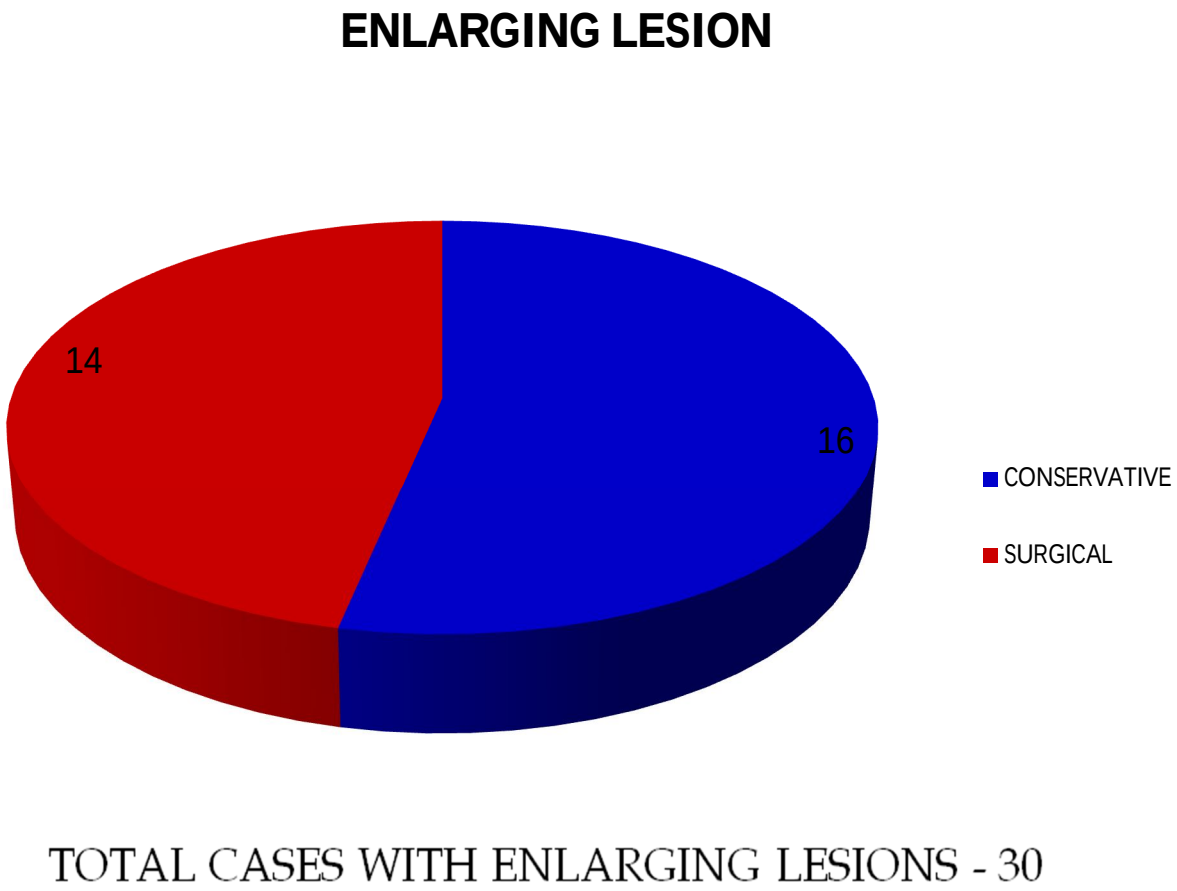


CHART 9: ENLARGING LEISON

10) CHANGE IN MANAGEMENT (MEDICAL) IN ENLARGING LESIONS

CONSERVATIVE CASES WITH CT CHANGES	NO OF PATIENTS	PERCENTAGE
CHANGE IN MEDICAL MANAGEMENT	12	75
NO CHANGE IN MEDICAL MANAGEMENT	4	25
TOTAL	16	100%

TABLE 14: CHANGE IN MEDICAL MANAGEMENT IN ENLARGING LESION

Of the sixteen cases with increasing lesions that are managed conservatively twelve cases showed some change in medical management

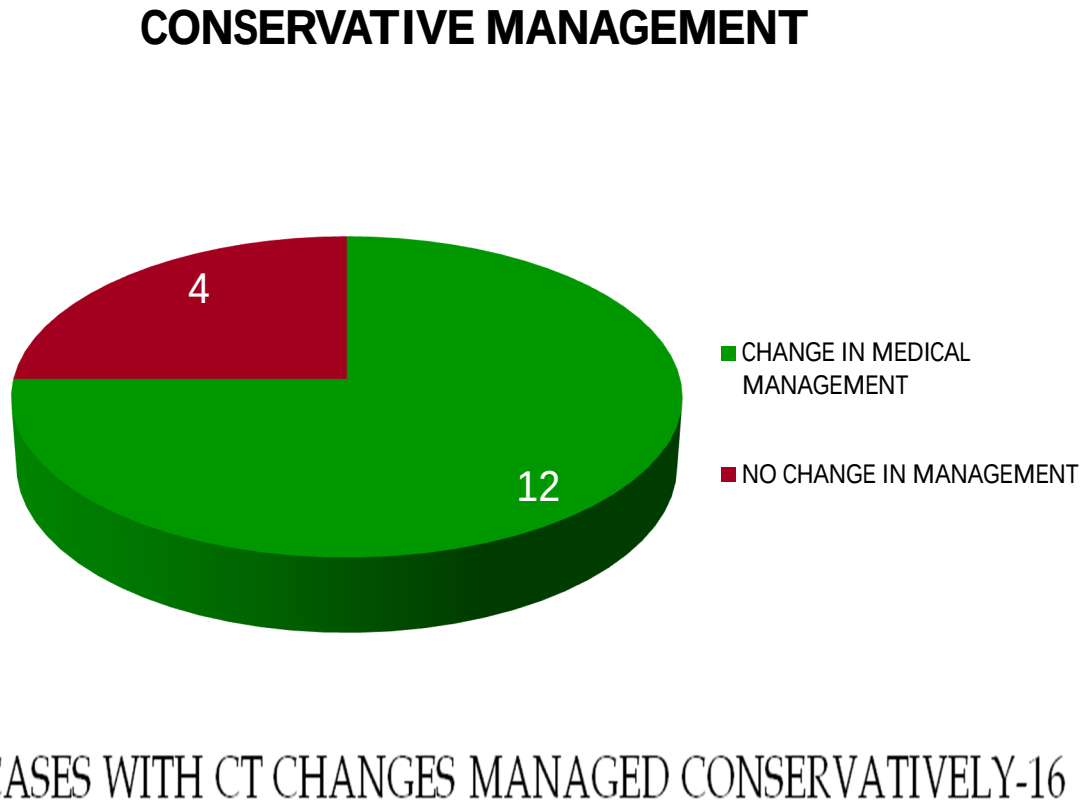


CHART 10: CHANGE IN MED MGT IN ENLARGING LESION

11) SURGICAL MANAGEMENT IN NEW LESIONS/FRESH LESION

NEW LESIONS	NO OF PATIENTS	PERCENTAGE
SURGICAL	3	25
CONSERVATIVE	9	75
TOTAL	12	100

TABLE 15: NEW LESIONS /FRESH LESION

Of the twelve cases that showed fresh/new lesions in repeat CT brain three cases were operated.

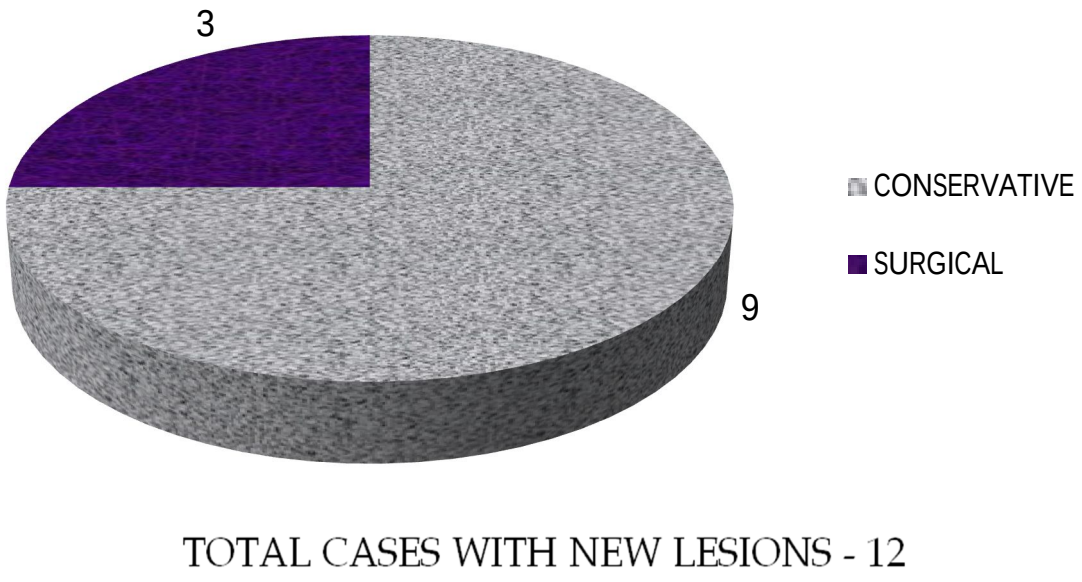


CHART 11: FRESH/NEW LESIONS

12) CHANGE IN MEDICAL MANAGEMENT IN FRESH/NEW LESIONS(CONSERVATIVE CASES)

NEW LESIONS MANAGED CONSERVATIVELY	NO OF PATIENTS	PERCENTAGE
CHANGE IN MEDICAL MANAGEMENT	7	77.78
NO CHANGE IN MEDICAL MANAGEMENT	2	22.22
TOTAL	9	100%

TABLE 16: CHANGE IN MEDICAL MANAGEMENT IN FRESH/NEW LESIONS

Of the nine cases that are managed conservatively in the fresh lesions that are detected in repeat CT brain seven cases needed alteration in their medical management.

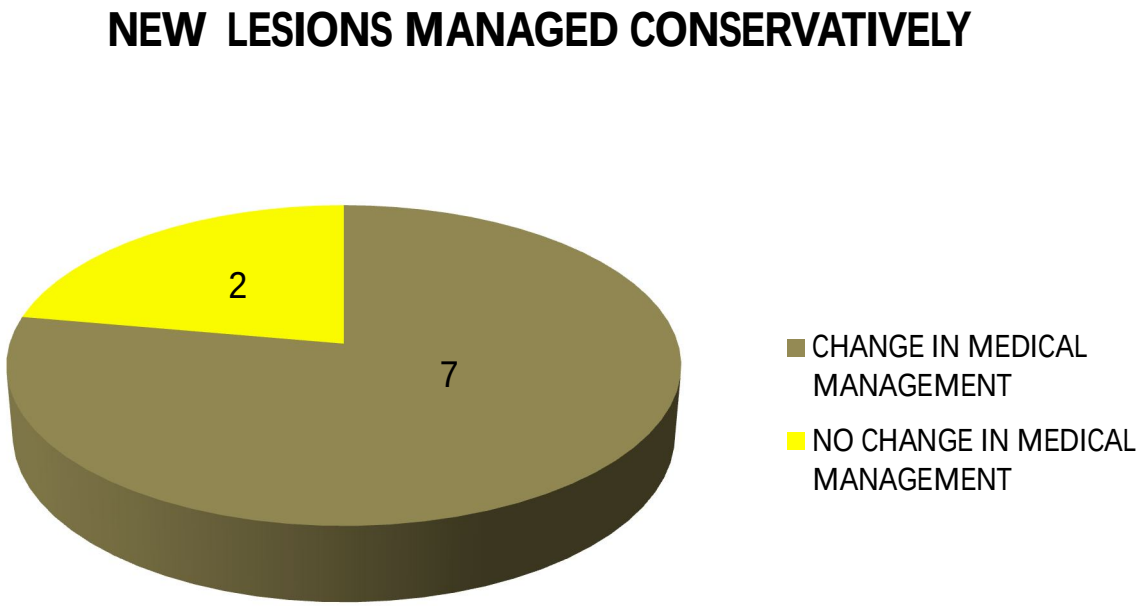


CHART 12 :CHANGE IN MEDICAL MANAGEMENT IN FRESH LESIONS

TABLE 17 :STATISTICAL ANALYSIS OF CHANGE IN MANAGEMENT

		Frequency	Percent	Valid Percent	Cumulative Percent	P value
Valid	Medical	19	5.4	5.4	5.4	
	Surgical	17	4.9	4.9	10.3	
	No change	314	89.7	89.7	100.0	**<0.001****
	Total	350	100.0	100.0		

On statistically analyzing **the influence of repeat CT brain** in changing the mode of management it is found to be highly significant with a positive predictive value

13) RESOLVING LESIONS

Of 350 cases who underwent repeat CT brain - 172 patients showed resolving lesion (49.14%)in the follow-up CT BRAIN

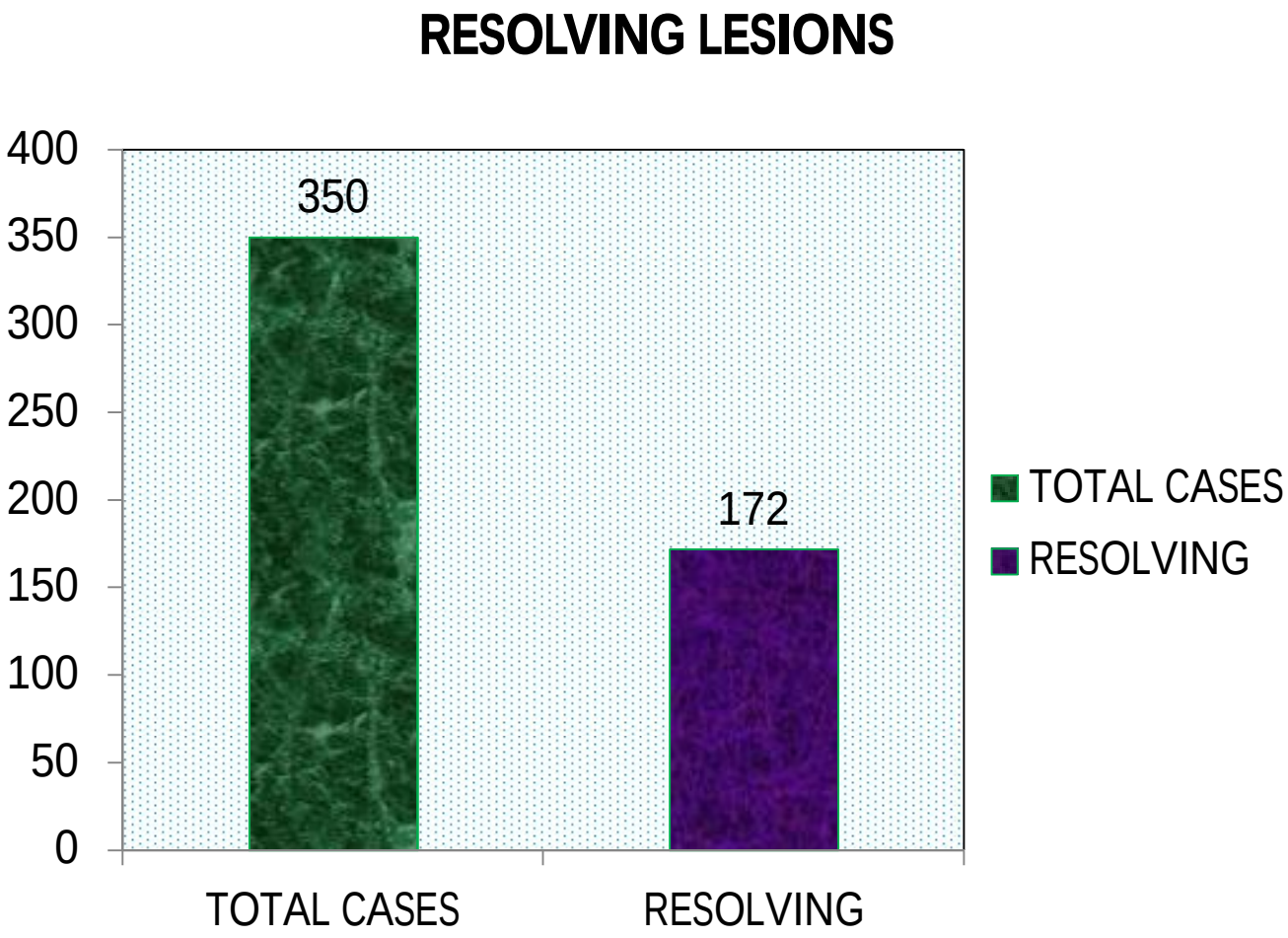


CHART 13: RESOLVING LESIONS

14) NO CHANGES IN LESION

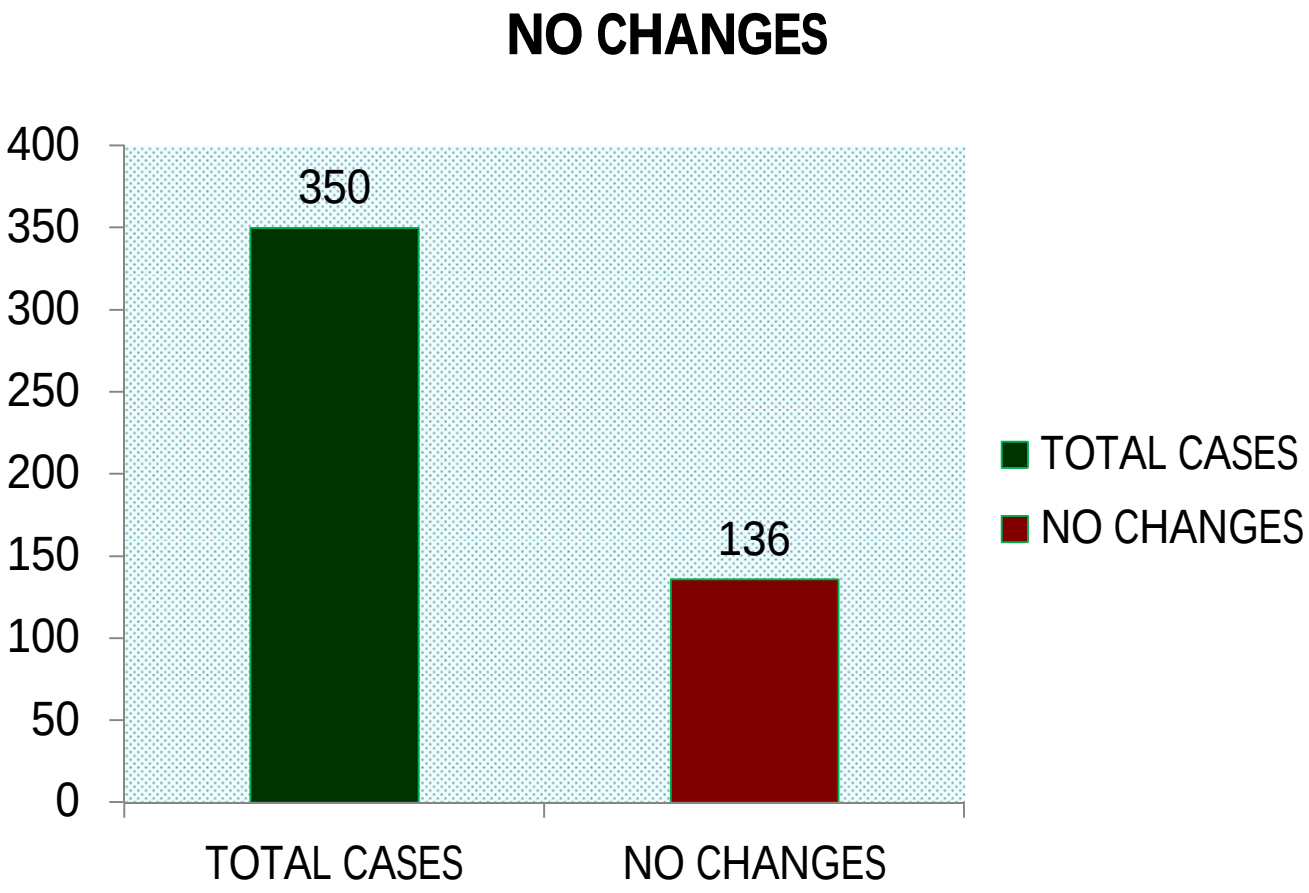


CHART 14: NO CHANGE IN LESION

136 Cases showed no change in size of lesion in repeat CT brain

15) REPEAT CT 24 HOURS VS 48 HOURS

	24 HOUR CT	48 HOUR CT	TOTAL
SURGICAL	14	3	17
CHANGE IN MEDICAL MANAGEMENT	17	2	19

TABLE 18: REPEAT CT 24 HOURS VS 48 HOURS

- Of 17 patients who were operated based on finding in repeat CT 14 cases were operated based on repeat CT1 (24 hours.)
- Of the total 19 cases that are managed conservatively and its medical management changed on repeat CT, 17 did so in first CT itself.
-

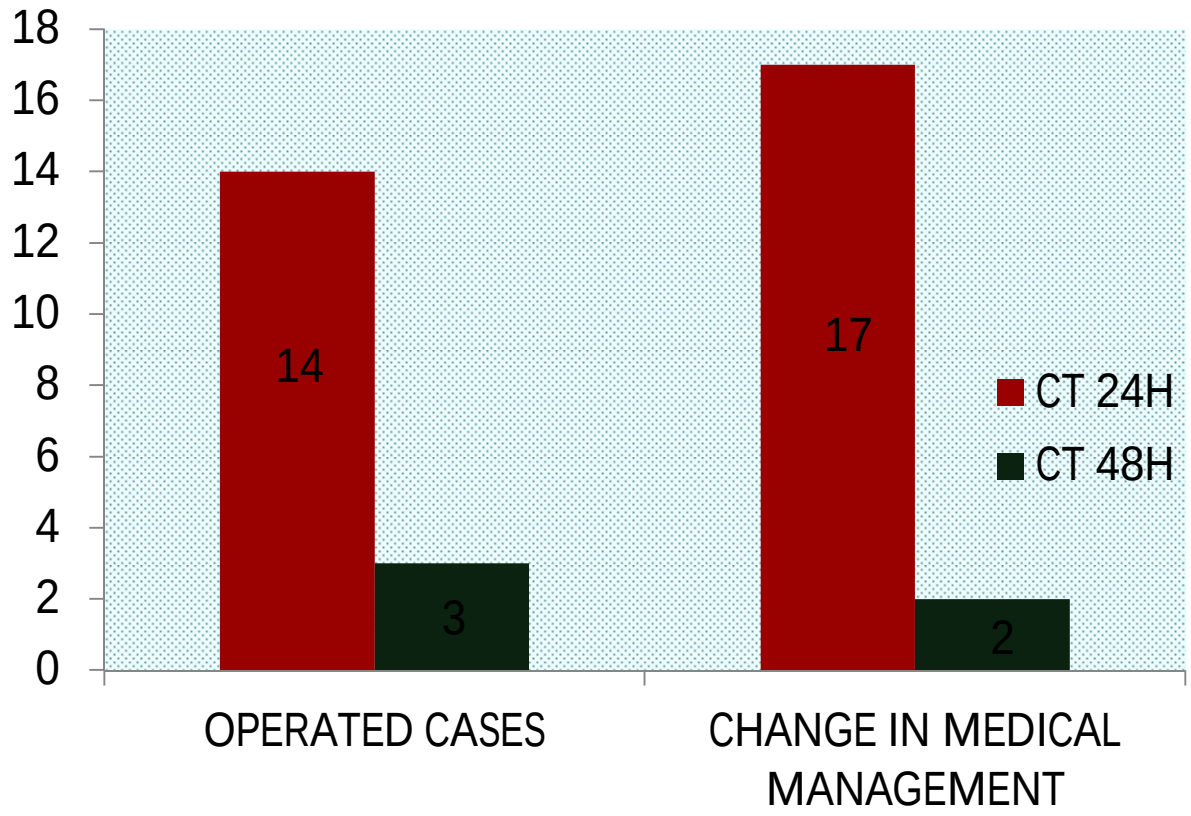


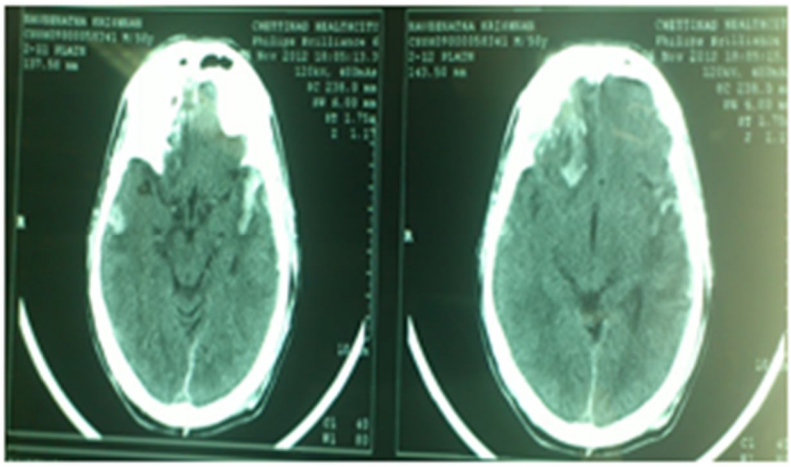
CHART 15: REPEAT CT 24 HOURS VS 48 HOURS

TABLE 19:24 HR CT VS 48 HR CT CROSSTABULATION

			48 HR CT			Total
			Increase	Decrease	Same	
24 HR CT	Enlarging	Count	0	0	14	14
		% within 24 HR CT	.0%	.0%	100.0%	100.0%
		% within 48 HR CT	.0%	.0%	5.4%	4.2%
	Resolving	Count	0	22	136	158
		% within 24 HR CT	.0%	13.9%	86.1%	100.0%
		% within 48 HR CT	.0%	31.4%	52.5%	47.0%
	Same	Count	4	47	102	153
		% within 24 HR CT	2.6%	30.7%	66.7%	100.0%
		% within 48 HR CT	57.1%	67.1%	39.4%	45.5%
	New/Fresh	Count	3	1	7	11
		% within 24 HR CT	27.3%	9.1%	63.6%	100.0%
		% within 48 HR CT	42.9%	1.4%	2.7%	3.3%
Total		Count	7	70	259	336
		% within 24 HR CT	2.1%	20.8%	77.1%	100.0%
		% within 48 HR CT	100.0%	100.0%	100.0%	100.0%

Above table shows the cross tabulation analysis between 24 and 48 hours. repeat CT brain.

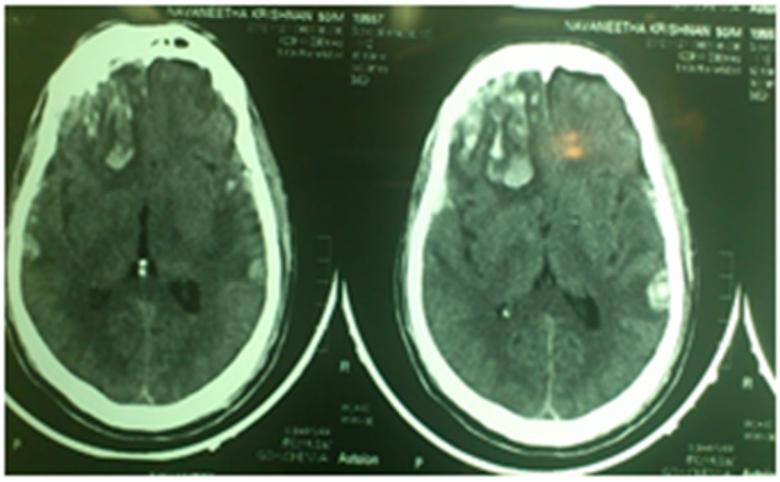
ENLARGING LESIONS – MANGED SURGICALLY



H/O RTA 3hrs

GCS E3V2M5

CONSERVATIVE

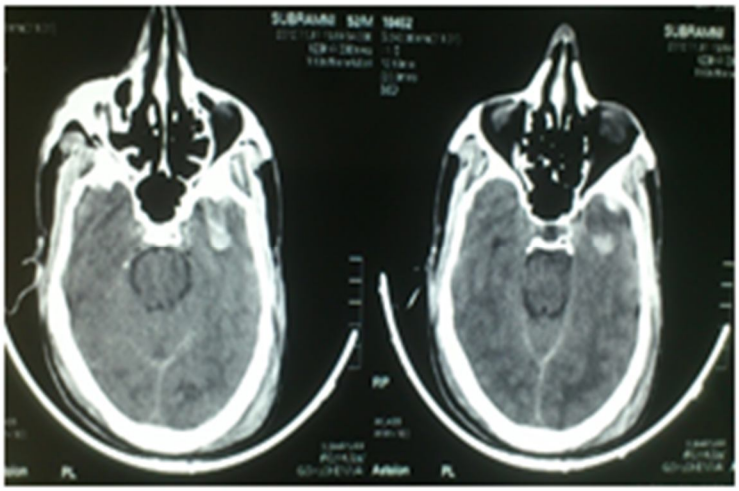


SAME GCS - 24hrs CT

OPERATED

This patient showed enlargement of existing lesions without any neurological deterioration and operated based on repeat CT at 24 hours.

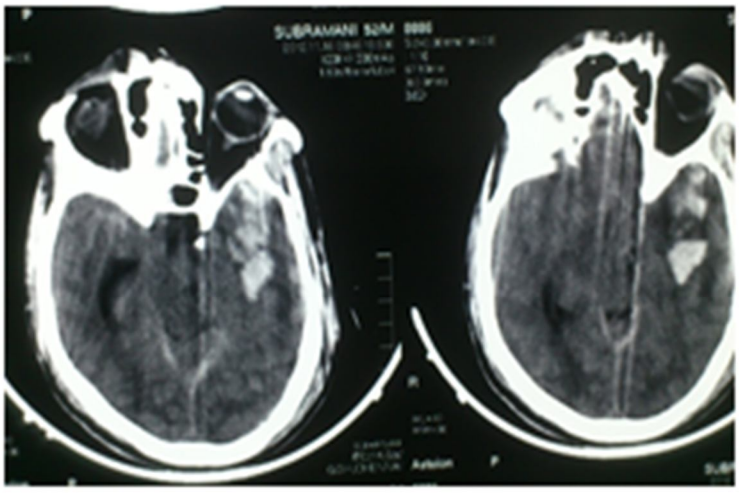
ENLARGING LESIONS – MANGED SURGICALLY



H/O FALL 8hrs

GCS E2V2M5

CONSERVATIVE

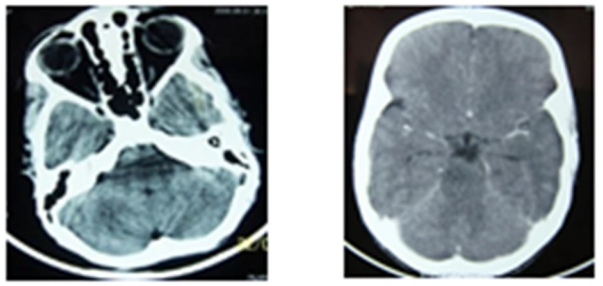


GCS SAME 24hrs CT

OPERATED

This patient showed enlargement of existing lesions without any neurological deterioration and operated based on repeat CT at 24 hours.

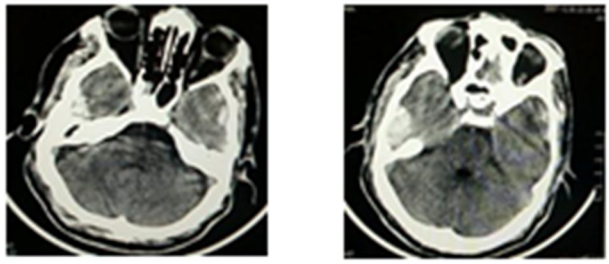
FRESH / NEW LESIONS MANGAED SURGICALLY



H/O Fall 6hrs

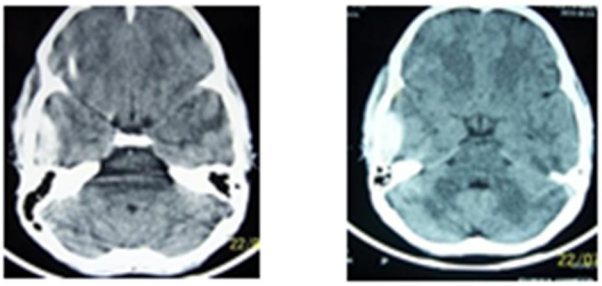
GCS: 15

Plan: Conservative



GCS: Same 24hrs CT

Plan: Conservative

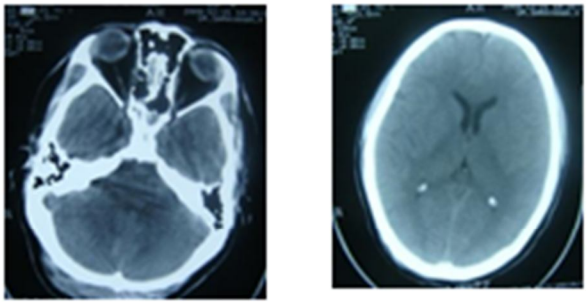


GCS: Same 48hrs CT

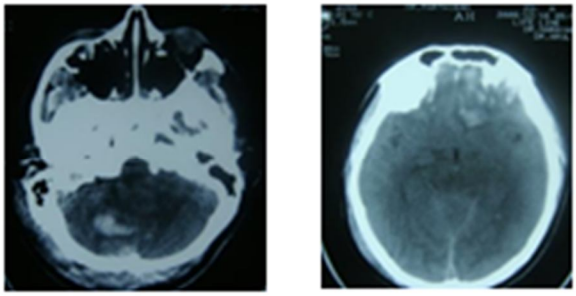
Plan: Surgery

This patient showed new lesions that enlarged without any neurological deterioration and operated based on repeat CT at 48 hours.

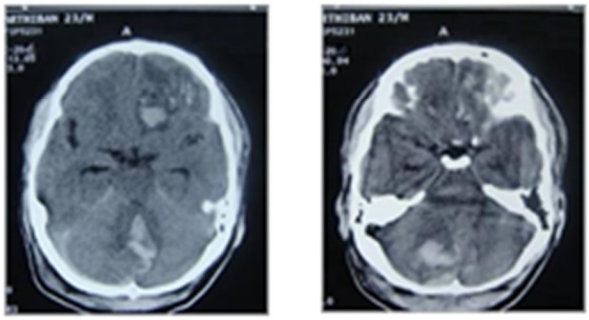
FRESH / NEW LESIONS MANGAED SURGICALLY



H/O RTA 6hrs
GCS: E3 V4 M5
Plan: Conservative



GCS: Same 24hrs CT
Plan: Conservative



GCS: Same 48hrs CT
Plan: Surgery

This patient showed new lesions that enlarged without any neurological deterioration and operated based on repeat CT at 48 hours.

16) FINAL OUTCOME

GLASGOW OUTCOME SCALE	NO OF PATIENTS
1	2
2	nil
3	1
4	30
5	317

TABLE 20: GOS

At the end of the study almost all patients were discharged in a state of good recovery to mild disability only two cases expired and both of them were operated based on findings in repeat CT.

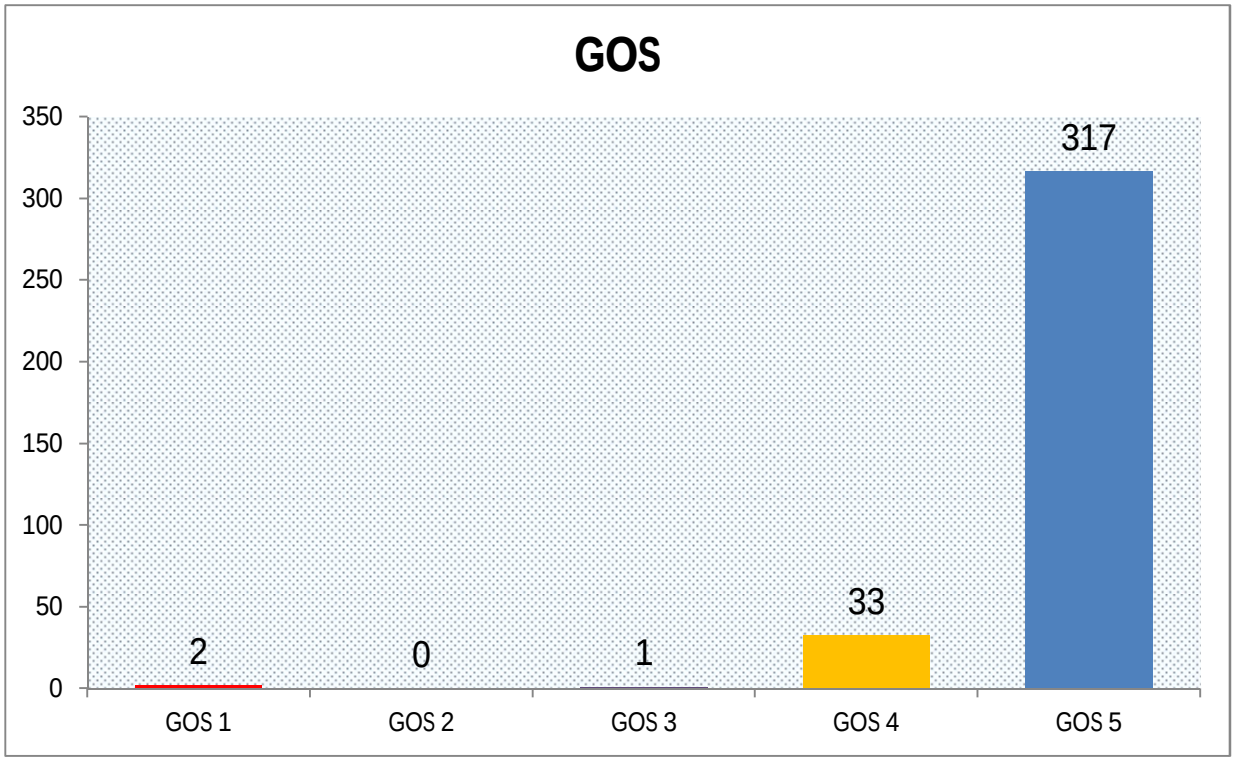


CHART 16: GOS

DISCUSSION

DISCUSSION

Although the importance of an initial CT scanning in patients with head injury is well known and investigation of choice there remains no firm consensus and guidelines on the utility of repeat CT in this population.

Significant changes in post-traumatic CT findings eg, hematomas and the appearance of new lesions may occur without any changes in the clinical and neurological status of the patient. One of the primary and essential goals of head injury management is detection before deterioration, and allowing for early detection and treatment of new lesions and enlarging lesions that require surgery. Wider availability of CT has resulted in earlier scanning in various hospitals and institute. It is thus particularly important to detect the secondary changes happening inside the brain very earlier in these patients.

The initial CT scan may be followed by a second CT within 24 hours and third CT at 48 hours for detection of evolving and new lesions. The need for routine repeat CT scans and quantification of the results of these in terms of change in the size lesions compared to first CT, development of new lesions and the role of routine follow-up CTs in influencing management requires clarification.

Several literatures have recommended that patients with head injury should undergo serial repeat CT scanning to allow prompt intervention and to minimize secondary brain injury. In most head injury CT was done within few hours from head injury and in these patients; repeat CT scans should be done to study progression of hemorrhagic lesions. At the same time, there are many reports questioning the need of routine serial repeat CT scans. In a recent study and systematic review of literature, Wang et al. concluded that the utility of repeat head CT in patients with traumatic brain injury remains controversial and more studies with parallel methodologies are needed to establish its role. Results of recent studies strongly suggest that repeat head CT is of no value in patients with mild head injury and normal neurological status.

This study was undertaken to analyze the value of repeat head CT done at 24 and 48 hours in clinically and neurologically stable patients.

STUDY PATTERN

Many of the study that analyzed the value of repeat CT were retrospective and analyzed the data and statistical value in arriving at a diagnosis but this study is a prospective study were 350 consecutive patients were enrolled after meeting the inclusion and exclusion criteria.

All the study compared and included neurological deterioration in their study. To completely analyze the value of imaging in determining the role of change in treatment modality in head injury patient and to diagnose the secondary changes that takes place in brain before they clinically manifest, patients showing neurological deterioration during study period were excluded and this is different from other study design in which patient showing neurological deterioration were included .

AGE

In this study head injury is more common in fourth decade (30-40yrs)with 138 patients (39.43%) followed by third decade (20-30yrs)with 106 patients(30.29%)These findings are similar to all international studies were head injury is common in third and fourth decade. pediatric patients up to 14 years of age are excluded from the study. The minimum age in study group was 17 and maximum is 78 years old

SEX

Out of the 350 patients, 281 patients (80.21%) are male and remaining 69 patients (19.79%) are female which is in comparison to the international statistics.

MODE OF INJURY

Of the 350 patients in study group road traffic accident is the leading cause of head injury with 286 patients (81.71%) followed by injury due to accidental fall 47 patients (13.43%) and head injury due to assault in 17 patients only (4.86%). In most of the study groups and international data it is same except in some countries and literature were injury due to assault comes at the second place.

GCS

In this study group only mild and moderate head injury patients (GCS> or =9) are included. Severe head injury patients (GCS 8 and less then that) are excluded from the study. Various international head injury statistics showed that mild and moderate head injury constitutes more than 70 to 75% and in my study mild head injured patients numbered 266(76%) and moderate head injury patients are 84(24%).

TIME AT WHICH FIRST CT TAKEN FROM THE ONSET OF INJURY

Many studies didn't give much importance to the time of initial or first CT, in this study majority of the CT scanning was done during the time period of 4-8hours (51.7%)followed by 0-4hours (45.14%)so majority of the patients underwent CT in the golden hours where mortality and morbidity can be prevented

at the earliest. Only 4 patients had their CT scanning done after 12 hours. The minimum time at which the CT done was 2 hours and the maximum time is 14 hours. Of these majority of about 130 patients (37.1%) did their CT scanning at 4 hours from the onset of injury and 114(32.6%) patients had their first CT at 6 hours from the time of injury.

Of the 17 patients who were operated the minimum time period at which initial CT is taken is 5hours(1 case)and the maximum time interval is 14 hours (1CASE).majority of them who were operated based on repeat CT took their first CT at 6 hours. (11 case 64.7%) and totally 13 patients did their CT less than 6hours.

Of the 19 patients who showed change in the medical management in the study the minimum time interval at which the first CT is taken is 4 hours. and maximum is 8 hours. In this group also the majority took their initial CT IN LESS THEN 6 HOURS (16 patients84.2%).

This study shows that majority of the patients had change in the mode of management based on repeat CT, had their first CT scanning done less than six hours, Ramesh and Sunil et al[13] also had similar findings in their study and incidence of surgical intervention was higher when the repeat CT scan was done were the

initial CT was done at 6 hours in their study done by yamaki et al. and Servadai et al.[10,18,19]

However, it should also be noted that there was significant proportion of patients with a CT scan done after 6 hours who had their mode of management changed based on repeat CT and they didn't showed any neurological deterioration therefore, if one does a repeat CT scan purely on the basis time interval from first CT, there are chances of missing some potentially curable lesion changes.

LESIONS IN FIRST/INITIAL CT

Hemorrhagic contusion are the common finding noted in 125 patients (35.7%)of the contusion detected frontal region is the most common site followed by temporal, only one case showed cerebellar contusion.

Mixed /multiple lesion is the next common finding noted in the study group.87 patients (24.9%)showed multiple lesions in the form of contusion with fracture,SDH With contusion ,EDH with fracture, multiple contusion.servadi et al,wang et al, lee et al all showed similar findings were brain contusion and mixed lesions were common .

SDH alone is seen in 38 cases (10.8%),EDH alone in 23 cases (6.6%) and fracture, subarachnoid hemorrhage in 22 cases (6.3%).

Diffuse axonal injury (DAI) is seen in 22 cases (5.1%) this is the largest number compared to any group were Sunil et al had only 1.2% and almost negligible in other group.

13

ICH (intracerebral hemorrhage) noted in 9 cases and primary IVH (intraventricular hemorrhage) in six cases (1.7%) noted in the study group.

EVOLVING/INCREASING LESION IN REPEAT CT

Of the 350 patients included in the study totally 30 patients showed increase in the size of already existing lesion in repeat CT scan. 26 cases showed increase in the size of lesion in the first repeat CT done at 24 hours, of this,

1. Contusion constitutes 13(50%)cases
2. Subdural hematoma 3(10%)cases
3. Intra cerebral bleed (ICH)constitutes 3(10%)cases
4. Extradural hematoma (EDH) constitutes 2(6.66%)
5. One case of pneumocephalus showed increase in size in CT at 24 hour
6. Multiple lesions with increase in size in 4 (16.66%)

7 Cases showed increase in the size of lesion in the second CT done at 48 hours, of these,

1. Contusion constitutes 3(42.9%)
2. Extradural hematoma (EDH) constitutes 2(28.6%)
3. Multiple lesions one case (14.3%)

4. Subdural hematoma one case (14.3%)

Three cases showed increase in the size of lesion in first repeat CT at 24hours and second repeat CT at 48 hours and all of them were hemorrhagic contusion and these patients also showed no neurological deterioration in the study.

So of 350 cases 30 cases (8.8%) showed increase in size without any neurological deterioration which is significantly higher.

Saravedi et al[19] in his study found that there is increase in the size of lesion in 28%of cases; Brown et al[3] noted that there is a progression in size of existing lesion in greater than 35%of cases, both the study took into account the patients who clinically deteriorated as well. Cope et al[6] concluded that expanding lesion can be detected with CT scanning even before they clinically deteriorate. Sirfi et al[20] is of contrary opinion that patient with mild head injury and neurologically stable showed little change in their repeat CT scan.

FRESH/NEW LESION

Of the total 350 cases new lesions were detected in 12 cases (3.43%), all these patients are neurologically stable, and there are no coagulation abnormalities or any co-morbid illness in these patients.

All the cases are detected in the first repeat CT done at 24 hours and none in the second repeat CT.

1. 8 cases was normal (DAI) in the initial CT and in repeat CT at 24 hours

   a) Contusion was detected in 4 cases

   b) EDH was detected in 3 cases

   c)one patient showed post traumatic RT MCA TERRITORY infarct
2. Two patients showed pure SDH alone in initial CT and subsequent repeat CT showed associated contusion also
3. One cases showed ICH alone in initial CT and subsequent repeat CT showed associated contusion
4. One cases showed RT FRONTAL CONTUSION initial CT and subsequent repeat CT showed BIFRONTAL CONTUSION

   Thus contusion seems to be the common new finding detected in repeat CT followed by EDH in neurologically stable patients

RESOLVING LESIONS AND SAME SIZE

- Of 350 cases, 172 showed resolving lesion (49.14%)
- Of 350 cases, 136 cases showed no changes (38.86%)

CHANGE IN MANAGEMENT

Of the 350 cases who are neurologically stable there is a change in the modality of management in 36(10.3%).

1. Change in medical management 19 cases (5.5%)
2. Change in surgical management 17 cases (4.8%)

CHANGE IN MEDICAL MANAGEMENT

19 cases had some sort of change in the medical management in the form of

- Anti-edema measures are started (mannitol,lasix)with calculated doses based on the findings in repeat CT and associated brain edema.
- If patient is already on anti-edema measures the dose is raised to achieve edema reduction.
- Additional measures like nasal oxygen, head end elevation are done.
- If needed patient are shifted to NEURO ICU for closely monitoring the patient.

Of the 19 cases 17 cases showed increase in size of hemorrhagic contusion, one case ICH size increased and in another patient there is increase in size of SDH.

CHANGE IN SURGICAL MANAGEMENT

Of the 350 cases in the study group who showed no signs of neurological deterioration `17 cases are operated before they deteriorated based on the findings in repeat CT scan. Of these,

- 7 cases that are operated were due to increase in size of contusion, decompressive craniotomy and evacuation of hemorrhagic contusion done.
- 4 cases are SDH showed increase in size and underwent decompressive craniotomy and evacuation of subdural hematoma done.
- 3 patients with EDH showed increase in size and decompressive craniotomy and evacuation of extradural hematoma was done.
- One case showed increase in size of ICH.
- One case of bifrontal pneumocephalus showed increase in size and midline shift for which burr hole and tapping done.
- One interesting case whose CT was normal initially showed a massive RT MCA territory infarct in the repeat CT at 24 hours and decompressive craniotomy was done.

ALL THESE PATIENTS DIDN'T SHOW ANY SIGNS AND SYMPTOMS OF NEUROLOGICAL DETERIORATION

In this study there is overall change in management in 10.3% of cases with medical management in 5.5% and surgical management in 4.8% of patients.

Ramesh and Sunil et al[13] showed change in the mode of management in about 20% of patients, 14% were operated based on findings in first CT and 9% were operated based on findings in third CT.

Wang et al[25] showed around 8% resulted in surgical management based on repeat CT that fell less than 3% after 2nd CT.

Givner et al[8] showed more than 32% of patients needed change in medical management based on findings in his repeat CT.

Brown et al[2] reported that there is change in modality of management in 38%of patients who worsened neurologically but in the clinically stable group the change in modality of management is only 1%.

Smith and miller et al[21,23] concluded that serial repeat CT is warranted only in patients with associated risk factors such as ,coagulopathy, poor GCS and in other patients it is not routinely indicated.

Stein et al[23] concluded that routine serial repeat scan in mild head injury patient is more cost effective in earlier intervention then other modalities of monitoring the patients.

24 HR VS 48 HR CT SCAN

Of the 36 patients who showed change in the mode of management 31 cases (86.1%)are based on first repeat CT at 24 hours and the remaining 5 cases based on second repeat CT2 at 48 hours.

Of the 31 cases 14 cases are operated and in 17 cases there was a change in medical management.

Of the 5 cases 3 cases are operated and in 2 cases there was a change in medical management.

In 14 cases 2nd repeat CT not taken since they are operated based on findings in first repeat CT.

FINAL OUTCOME (GOS)

327 cases are discharged at good recovery and 30 cases with mild disability, 2 cases expired both of them were operated based on findings in first repeat CT. In the first case there was right frontal contusion and lefttemperoparietal ICH on initial CT, repeat CT showed increase in size with mass effect due to ICH, decompression was done but the patient expired in the 3rd postoperative day.

IN the second case ,the initial CT was normal, patient GCS score was 9 and he sustained injury due to RTA, the subsequent repeat CT showed massive RT MCA territory infarct with midline shift, emergency decompression done but patient expired in the 2nd postoperative day.

Both these patients had moderate head injury.

All the remaining patients didn't showed any neurological deterioration after 48 hours and repeat CT done at the time of discharge only to patients whose modality of management changed and all these patients showed decrease in size or disappearance of lesions who were operated or managed conservatively.

CONCLUSION

CONCLUSION

Repeat CT scans done at 24 and 48 hours after head injury were found to be of value in detecting new/fresh lesions and enlargement of existing lesions .

There is a change in the mode of management either medically or surgically in significant proportion of patients based on **ROUTINE FOLLOW-UP CT BRAIN .**

Repeat CT scans resulted in change in treatment protocol even in patients with no signs of clinical deterioration and thus may be of value in detecting changes at a very early stage before the secondary changes in brain results in clinical deterioration.

CT scanning, being a cost effective tool can be used for routine follow-up in mild and moderate head injury patients in preventing the mortality and morbidity by detecting the lesions earlier before they deteriorate.

PROFORMA

MADRAS INSTITUTE OF NEUROLOGY

PROFORMA

VALUE OF ROUTINE FOLLOW-UP CT BRAIN IN MILD AND MODERATE HEAD INJURY PATIENTS

Serial No:

Name: Age: Sex: M / F

MIN No: I.P. No:

Mode of Injury: RTA / ASSAULT / FALL FR HT / OBJ FALL / UK

Time interval between injury and admission:

Time interval between injury and first CT scan:

History

History of loss of consciousness (LOC):

LOC in minutes:

History of vomiting – No. of episodes :

History of seizure – Type of seizure :

– No. of episodes

History of Ear, Nose, and Throat bleeding:

History of headache

History of blurring of vision

History of motor weakness

History of sensory weakness

On examination

Admission Glasgow coma scale : mild (13-15) or moderate(9-12)

Scalp injury : Yes / No

Associated polytrauma : Yes / No

Pupil's symmetry, size :

Pupil's reaction to light :

Pulse in minute :

Any neurological deficit :

Any cranial nerve dysfunction :

Cranial nerve examination :

Any other system disorder :

Investigation

INITIAL CT FINDING AFTER INJURY

a) Fractures – un displaced /linear/depressed ,comminuted

b) EDH

c) SDH

d) SAH

e) ICH

f) IVH

g) Pneumocephalus

H) Contusions

i) Mixed lesions

j) DAI

REPEAT CT FINDING

1. First scan at 24 hour :

2. Second scan finding at 48 hours :

(If needed)

CT FINDINGS

1) Any new lesion detected

2) Increase in size of old lesion

3) Decrease in size of old lesion

4) No change in lesion

5) Change in management

6) Managed surgically/ conservatively

Outcome (GLASGOW OUTCOME SCALE) :

BIBLIOGRAPHY

BIBLIOGRAPHY

1. Ashraf,Abdul,Johari et al. THE ROLE OF REPEAT CT IN MILD TBI WITH POSITIVE INITIAL CT Med J Malaysia Vol 67 No 3 June 2012

2. Brown CV, Weng J, Oh D, et al. Does routine serial computed tomography of the head influence management of traumatic brain injury? A prospective evaluation. J Trauma. 2004;57:939–943.

3. Brown CV, Zada G, Salim A, et al. Indications for routine repeat head computed tomography (CT) stratified by severity of traumatic brain injury J Trauma. 2007;62:1339–1345.

4. Bruce Lee.Andrew Newberg EtAl.Neuroimaging In Traumatic Brain Imaging. NeuroRx. 2005 April; 2(2): 372–383.

5. Cooper PR, Maravilla K, Moody S, et al. Serial computerized tomographic scanning and the prognosis of severe head injury. Neurosurgery. 1979;5:566–569.

6. Cope DN, Date ES, Mar EY. Serial computerized tomographic evaluations in traumatic head injury. Arch Med Rehabil.1988;69:483–486 Phys

7. Figg RE, Burry TS, VanderKolk WE. Clinical efficacy of serial computed tomographic scanning in severe closed head injury patients. J Trauma. 2003;55:1061–1064.

8. Givner A, Gurney J, O'Connor D, et al. Reimaging in pediatric neurotrauma: factors associated with progression of intracranial injury. J Pediatr Surg. 2002;37:381–385.

9. Kaups KL, Davis JW, Parks SN. Routinely repeated computed tomography after blunt head trauma: does it benefit patients? J Trauma. 2004;56:475–481.

10. Lee TT, Aldana PR, Kirton OC, et al. Follow-up computerized tomography (CT) scans in moderate and severe head injuries: correlation with Glasgow Coma Scores (GCS), and complication rate. Acta Neurochir (Wien). 1997;139:1042–1048.

11. Malachi,Juven et al.Repeat Cranial Tomography In Patients With Mild Head Injury And Stable Neurological Examination. Chinese Journal of Traumatology.

12. Narayan RK, Maas AI, Servadei F, et al. Traumatic Intracerebral Hemorrhage Study Group. Progression of traumatic intracerebral hemorrhage: a prospective observational study. J Neurotrauma. 2008;25:629–639.

13. Ramesh.S.Doddamani,Sunil,Paramjeet Singh et al. Role of repeat CT scans in the management of traumatic brain injury. J Neurotrauma. 2012;25:129–209.

14. Roberson FC, Kishore PR, Miller JD, et al. The value of serial computerized tomography in the management of severe head injury. . Surg Neurol. 1979;12:161–167.

15. Roka,Bista et al. Role Of Repeat Ct Scan In Initially Inoperable Cases Of Traumatic Head Injury. Surg Neurol. 1979;12:161–167.

16. Sakai H, Takagi H, Ohtaka H, et al. Serial changes in acute extradural hematoma size and associated changes in level of consciousness and intracranial pressure. J Neurosurg. 1988;68:566–570.

17. Saleh,Lulia et al . The Value OfScedulded Repeat Cranial CT After Mild Head Injury. Neurosurgery 72:56–64, 2013.

18. Servadei F, Murray GD, Penny K, et al. The value of the “worst” computed tomographic scan in clinical studies of moderate and severe head injury. Neurosurgery. 2000;46:70–77.

19. Servadei F, Nanni A, Nasi MT, et al. Evolving brain lesions in the first 12 after head injury: analysis of 37 comatose patients. Neurosurgery. 1995;37:899–907.

20. Sifri ZC, Homnick AT, Vaynman A, et al. A prospective evaluation of the value of repeat cranial computed tomography in patients with minimal head injury and an intracranial bleed. Neurosurgery June 27, 2011.

21. Smith JS, Chang EF, Rosenthal G, et al. The role of early follow-up computed tomography imaging in the management of traumatic brain injury patients with intracranial hemorrhage. J Trauma. 2007;63:75–82.

22. Soloniuk D, Pitts LH, Lovely M, et al. Traumatic intracerebral hematomas: timing of appearance and indications for operative removal. J Trauma. 1986;26:787–794.

23. Stein SC, Fabbri A, Servadei F. Routine serial computed tomographic scans in mild traumatic brain injury: when are they cost-effective. Neurosurgery.1992;30:160–165.

24. Tabori,Uri.Kornecki et al.Repeat CT Scan Within 24-48 Hours Of Admission In Children With Moderate And Severe Head Trauma. Critical Care Medicine:Volume 28(3)March 2000 pp 840-844.

25. Wang MC, Linnau KF, Tirschwell DL, et al. Utility of repeat head computed tomography after blunt head trauma: a systematic review. . J Trauma. 2006;61:226–233.

MASTER CHART

S.NO	NAME	AGE	SEX	MIN No	MOI	GCS	URY AI	CT Findings	24 HR CT	48 HR CT	ONSERVATIV	SURGERY	[	GOS
1	SHANKAR	62	M	12366	RTA	11	6	IULTIPLE-LT FRONTAL CONT,LT FTP SD	INCREASE	NT	-	OPERATED	YES-SURGICAL	4
2	SENTHILKUMAR	33	M	12368	RTA	15	6	CONTUSION-RT FRONTAL	DECREASE	SAME	CONS	-	NO	5
3	EZHIL	35	M	12371	ASSAULT	10	6	CON-RT TEMP	DECREASE	SAME	CONS	-	NO	5
4	SANJAY	18	M	12376	RTA	15	8	CONTUSION-LT FRONTAL	DECREASE	SAME	CONS	-	NO	5
5	CHANDRAN	52	M	12380	RTA	12	6	CONTUSION-LT TEMPORAL	INCREASE	INCREASE	YES	-	YES-MED	5
6	THENNARASU	28	M	12382	RTA	15	4	TIPLE-RT TEMP FRAC,RT TEMP CONTU	DECREASE	DECREASE	CONS	-	NO	5
7	MARTIN	19	M	12385	RTA	14	5	VIULTIPLE-OCC FRAC,BIFRONTAL CON	DECREASE	SAME	CONS	-	NO	5
8	THULASI	26	F	12389	FALL	11	6	CONTUSION-LT FRONTAL	DECREASE	SAME	CONS	-	NO	4
9	RATISH	22	M	12395	RTA	11	14	SDH-LT FTP	SAME	DECREASE	CONS	-	NO	5
10	VIJAYAKUMAR	36	M	12401	RTA	15	4	SAH-LT SYLVIAN	DECREASE	SAME	CONS	-	NO	5
11	RAJKUMAR	36	M	12409	RTA	13	4	EDH-RT PARIETAL	DECREASE	SAME	CONS	-	NO	5
12	ARUMUGAM	56	M	12421	RTA	9	5	IVH-TEMPORAL HORN	SAME	DECREASE	CONS	-	NO	5
13	VIDHYA	38	F	12426	RTA	12	4	CONTUSION-LT FRONTAL	DECREASE	DECREASE	CONS	-	NO	5
14	LATHA	40	F	12431	RTA	13	6	MULTIPLE-LT FR FRAC,LT FR CONT	SAME	SAME	YES		NO	5
15	SURESH KUMAR	32	M	12438	ASSAULT	13	5	MULTIPLE-RT FRONT FRAC WITH EDH	SAME	DECREASE	CONS	-	NO	5
16	SUBRAMANI	52	M	12441	FALL	10	5	CONTUSION-LT FRONTAL	INCREASE	NT	-	OPERATED	YES-SURG	4
17	SENTHILKUMAR	22	M	12443	RTA	14	6	EDH-LT PARIETAL	SAME	DECREASE	CONS	-	NO	5
18	VIJAYAN	26	M	12447	RTA	15	8	CONTUSION-LT FRONTAL	DECREASE	SAME	CONS	-	NO	5
19	FARUK	24	M	12449	RTA	15	4	FRACTURE-RT FRONTAL	SAME	SAME	CONS	-	NO	5
20	KAMAL	24	M	12451	RTA	13	4	CON-RT TEMP	SAME	DECREASE	CONS	-	NO	5
21	ARUN	26	M	12456	RTA	13	8	NORMAL	CON-RT TEM	SAME	CONS	-	YES-MED	4
22	VINAYAGAM	22	M	12454	RTA	14	4	MULTIPLE-RT TEMP FRAC WITH EDH	DECREASE	SAME	CONS	-	NO	5
23	SURESH	31	M	12458	RTA	15	6	FRACTURE-LT FRONTAL	SAME	SAME	CONS	-	NO	5
24	GNANASEKAR	35	M	12460	RTA	14	6	EDH-RT PARIETAL	DECREASE	SAME	CONS	-	NO	5
25	jegan	29	m	12464	RTA	13	6	RT SYLVIAN SAH	DECREASE	SAME	CONS	-	NO	5
26	VINEETH	28	M	12466	RTA	15	8	CONTUSION-LT FRONTAL	DECREASE	DECREASE	CONS	-	NO	5
27	SURESH	22	M	12464	RTA	12	4	SDH-LT FTP	DECREASE	SAME	CONS	-	NO	5
28	SANDHYA	36	F	12469	ASSAULT	13	6	CONTUSION-RT FRONTAL	INCREASE	SAME	CONS	-	NO	5
29	KAJALKUMARI	28	F	12473	RTA	15	4	TIPLE-RT TEMP FRAC,RT TEMP CONTU	DECREASE	DECREASE	CONS	-	NO	5
30	VELAYUTHAM	78	M	12475	FALL	15	6	CONTUSION-RT FRONTAL	SAME	DECREASE	CONS	-	NO	5
31	VIJAYA	35	F	12476	RTA	13	6	CONTUSION-RT TEMPORAL	SAME	DECREASE	CONS	-	NO	5
32	VEDHA	38	F	12479	RTA	14	6	CONTUSION-RT FRONTAL	DECREASE	SAME	CONS	-	NO	4

33	SANJAY	22	M	12483	RTA	11	4	DAI	SAME	SAME	CONS	-	NO	5
34	RAMASAMY	45	M	12488	RTA	14	6	CONTUSION-RT FRONTAL	DECREASE	SAME	CONS	-	NO	5
35	KAMALNATH	42	M	12492	RTA	15	4	FRACTURE-RT FRONTAL	SAME	SAME	CONS	-	NO	5
36	KANNAMAL	48	F	12500	RTA	15	6	EDH-RT PARIETAL	DECREASE	DECREASE	CONS	-	NO	5
37	SNEHA	22	F	12507	RTA	15	4	TIPLE-RT TEMP FRAC,RT TEMP CONTU	DECREASE	SAME	CONS	-	NO	5
38	VELU	40	M	12512	RTA	12	6	CONTUSION-LT TEMPORAL	SAME	INCREASE	CONS		YES-MED	5
39	PREM	26	M	12519	RTA	14	4	:MP FRAC,RT TEMP CONTUSION,LT TE	DECREASE	SAME	CONS	-	NO	5
40	THILAKAN	46	M	12537	FALL	13	10	SDH-LT FTP	DECREASE	SAME	CONS	-	NO	5
41	SANTHAKUMAR	34	M	12540	FALL	14	4	EDH-LT PARIETAL	SAME	DECREASE	CONS	-	NO	5
42	DEVARAJ	66	M	12544	RTA	15	6	CONTUSION-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
43	VIRUMANDI	39	M	12547	RTA	11	3	MULTIPLE-OCC FRAC,BIFRONTAL CON	SAME	DECREASE	CONS	-	NO	5
44	DINESH	26	M	12551	RTA	14	8	CONTUSION-RT FRONTAL	DECREASE	SAME	CONS	-	NO	5
45	MURUGAN	34	M	12559	RTA	13	4	SDH-RT FTP	DECREASE	SAME	CONS	-	NO	5
46	CHANDRAN	36	M	12569	RTA	13	6	CONTUSION-LT FRONTAL	DECREASE	SAME	CONS	-	NO	5
47	MONIKA	19	F	12571	RTA	12	4	NORMAL	CON-RT TEM	SAME	CONS	-	YES-MED	5
48	DILLI	45	M	12572	RTA	14	6	EDH-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
49	KADAMBAN	34	M	12573	RTA	11	3	ICH-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
50	ALAGAN	22	M	12575	RTA	13	6	CONTUSION-RT FRONTAL	DECREASE	SAME	CONS	-	NO	5
51	VENKATESHAN	39	M	12578	RTA	15	6	FRACTURE-RT FRONTAL	SAME	SAME	CONS	-	NO	5
52	RAJA	36	M	12580	RTA	14	4	:MP FRAC,RT TEMP CONTUSION,LT TE	DECREASE	DECREASE	CONS	-	NO	5
53	SANTOSH	24	M	12582	RTA	13	6	IVH-RT OCCIPITAL	SAME	DECREASE	CONS	-	NO	4
54	RAMKUMAR	44	M	12584	RTA	11	2	SAH-LT SYLVIAN	DECREASE	SAME	CONS	-	NO	5
55	VINAYAGAM	33	M	12586	RTA	15	12	CONTUSION-LT FRONTAL	DECREASE	SAME	CONS	-	NO	5
56	MANIMEGALAI	33	F	12589	RTA	15	8	FRACTURE-RT FRONTAL	SAME	SAME	CONS	-	NO	5
57	RANGAN	33	M	12590	RTA	15	6	CONTUSION-LT FRONTAL	DECREASE	SAME	CONS	-	NO	5
58	KASTHURI	66	F	12591	FALL	15	8	FRACTURE-LT FRONTAL	SAME	SAME	CONS	-	NO	5
59	GANESH	19	M	12593	RTA	11	6	MULTIPLE-RT FR CONT,LT TP ICH	INCREASE	NT	-	operated	YES-SURG	1
60	MANOJ	34	M	12596	RTA	12	5	IVH-RT OCCIPITAL HORN	SAME	SAME	CONS	-	NO	5
61	SANTOSH	25	M	12600	RTA	13	4	:MP FRAC,RT TEMP CONTUSION,LT TE	SAME	DECREASE	CONS	-	NO	5
62	THILAK	34	M	12606	RTA	15	6	CONTUSION-RT FRONTAL	DECREASE	SAME	CONS	-	NO	5
63	BUVANA	44	F	12609	RTA	9	3	DAI	SAME	SAME	CONS	-	NO	5
64	GOMATHY	44	F	12619	FALL	14	6	CONTUSION-LT FRONTAL	DECREASE	DECREASE	CONS	-	NO	5
65	KANAGA	32	F	12613	RTA	13	4	SDH-RT FTP	DECREASE	SAME	CONS	-	NO	5

66	PRAVEEN	24	M	12637	RTA	15	7	FRACTURE-RT FRONTAL	SAME	SAME	CONS	-	NO	5
67	RAJESH	33	M	12643	RTA	14	6	CONTUSION-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
68	THIRUMANGAI	38	F	12654	RTA	13	8	CONTUSION-RT FRONTAL	INCREASE	SAME	CONS	-	YES-MED	5
69	VISHWAYA	56	M	12660	RTA	13	3	SDH-LT FTP	DECREASE	SAME	CONS	-	NO	5
70	KAMALA	44	F	12670	RTA	15	4	SAH-LT SYLVIAN	DECREASE	DECREASE	CONS	-	NO	5
71	ANJANAPPA	39	M	12675	RTA	13	4	SAH-RT SYLVIAN	DECREASE	SAME	CONS	-	NO	5
72	MAHESH	55	M	12677	ASSAULT	13	4	EMP FRAC,RT TEMP CONTUSION,LT TE	SAME	DECREASE	CONS	-	NO	5
73	KALA	62	F	12679	RTA	9	12	ICH-LT GC	INCREASE	NT	-	operated	YES-SURG	`1
74	VINOTHAN	34	M	12680	FALL	14	4	EDH-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
75	KANAGA	49	F	12682	RTA	12	6	CONTUSION-RT TEMPORAL	SAME	DECREASE	CONS	-	NO	5
76	KRISHNAMOORTHY	66	M	12684	FALL	13	4	EDH-LT PARIETAL	SAME	DECREASE	CONS	-	NO	5
77	karpagam	44	f	12692	RTA	14	4	EDH-RT TEMPORAL	SAME	SAME	CONS	-	NO	5
78	MANOJ	25	M	12698	RTA	15	6	CONTUSION-LT FRONTAL	DECREASE	SAME	CONS	-	NO	5
79	BAKIYALAXMI	34	F	12708	FALL	15	10	FRACTURE-LT FRONTAL	SAME	SAME	CONS	-	NO	5
80	MOHAN	33	M	12721	RTA	15	6	CONTUSION-LT FRONTAL	DECREASE	DECREASE	CONS	-	NO	5
81	MOHANRAJ	33	M	12730	ASSAULT	15	4	FRACTURE-LT PARIETAL	SAME	SAME	CONS	-	NO	5
82	NAGARAJ	26	M	12734	RTA	13	6	ICH-LT GC	DEC	SAME	CONS	-	NO	5
83	PANNEERSELVAM	36	M	12743	RTA	13	4	SDH-RT FTP	SAME	SAME	CONS	-	NO	5
84	RAMESH	19	M	12756	RTA	13	4	SDH-RT FTP	DECREASE	SAME	CONS	-	NO	5
85	SUKANYADEVI	23	F	12769	RTA	13	3	SDH-RT FTP	SAME	SAME	CONS	-	NO	5
86	ELAKYA N	24	M	12777	RTA	15	6	CONTUSION-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
87	MAHESWARI	33	F	12779	RTA	11	4	DAI	SAME	SAME	CONS	-	NO	5
88	RAMAIAH	42	M	12781	RTA	12	6	CONTUSION-LT TEMPORAL	INCREASE	INCREASE	CONS	-	YES-MED	5
89	VINAYAGAM	49	M	12788	RTA	11	3	ICH-RT TEMPORAL	DECREASE	DECREASE	CONS	-	NO	5
90	KALASEKARAN	78	M	12792	RTA	9	9	NORMAL	NFARCT -RT MC/	NT		operated	YES-SURG	1
91	RAHIMBAI	45	M	12794	ASSAULT	11	3	IPLE-RT FRONTAL FRAC WITH PC,RT FR	SAME	SAME	CONS	-	NO	5
92	MOHAN	23	M	12795	FALL	15	4	EDH-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
93	NAGARAJ	25	M	12797	RTA	15	6	CONTUSION-LT FRONTAL	DECREASE	SAME	CONS	-	NO	5
94	MAHESH KUMAR	23	M	12796	RTA	13	4	PLE-RT TEMP FRAC WITH EDH,CSF OTC	SAME	SAME	CONS	-	NO	5
95	KANNAMA	72	F	12798	FALL	14	4	CONTUSION-RT TEMPORAL	SAME	DECREASE	CONS	-	NO	5
96	VIMALA	45	F	12799	RTA	13	6	CONTUSION-RT FRONTAL	DECREASE	SAME	CONS	-	NO	5
97	MAHENDRAN	34	M	12800	RTA	14	5	EMP FRAC,RT TEMP CONTUSION,LT TE	DECREASE	SAME	CONS	-	NO	5
98	SANGEETHA	31	F	12802	RTA	13	4	SAH-LT SYLVIAN	DECREASE	SAME	CONS	-	NO	5

99	THANGARAJ	39	M	12803	RTA	15	4	CONTUSION-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
100	ALANGIR	67	M	12805	FALL	10	6	NORMAL	CON-RT TEMP	SAME	CONS	-	YES-MED	4
101	JOHN	44	M	12806	RTA	14	5	SDH-RT FTP	DECREASE	SAME	CONS	-	NO	5
102	VELAYUTHAM	39	M	12807	FALL	13	4	.E-RT FR FRAC,RT FR CON,CSF RHINOR	SAME	SAME	CONS	-	NO	5
103	SANDHYA	22	F	12809	RTA	15	6	CONTUSION-RT FRONTAL	DECREASE	SAME	CONS	-	NO	5
104	ELANGO	49	M	12810	RTA	13	6	MULTIPLE-RT TEMP FRAC WITH EDH	SAME	SAME	CONS	-	NO	5
105	RAJESWARI	22	F	12811	FALL	14	4	FRACTURE-LT FRONTAL	SAME	SAME	CONS	-	NO	5
106	PARTIBAN	24	M	12813	RTA	14	2	MULTIPLE-LT FRONT FRAC WITH EDH	DECREASE	SAME	CONS	-	NO	5
107	DEVADASS	33	M	12817	RTA	13	6	TIPLE-RT PARIETAL FRAC WITH CONTU	SAME	SAME	CONS	-	NO	5
108	SARAVANAN	36	M	12819	RTA	12	5	CONTUSION LT FRONTAL	INCREASE	SAME	CONS	-	YES-MED	5
109	MANIMEGALAI	34	F	12820	RTA	15	6	CONTUSION RT TEMPORAL	SAME	SAME	CONS	-	NO	5
110	PRAVEENA	21	F	12827	RTA	12	2	DAI	SAME	SAME	CONS	-	NO	5
111	MANJULA	24	F	1283O	RTA	14	5	EMP FRAC,RT TEMP CONTUSION,LT TE	DECREASE	SAME	CONS	-	NO	5
112	SRINIVASAN	77	M	12832	FALL	13	4	CONTUSION RT TEMPORAL	SAME	SAME	CONS	-	NO	5
113	MANJULA	38	F	12835	FALL	13	12	SDH-RT FTP	SAME	INCREASE		operated	YES-SURG	5
114	ARUMUGAM	34	M	12836	RTA	14	6	CONTUSION RT FRONTAL	SAME	SAME	CONS	-	NO	5
115	ULAGANATHAN	44	M	12857	RTA	14	4	FRACTURE-LT FRONTAL	SAME	SAME	CONS	-	NO	5
116	THANGAIAH	45	M	12859	RTA	13	5	CONTUSION RT FRONTAL	SAME	SAME	CONS	-	NO	5
117	PONRAJ	29	M	12865	RTA	15	6	CONTUSION-RT TEMPORAL	DECREASE	DECREASE	CONS	-	NO	5
118	BINNY	45	M	12867	ASSAULT	13	4	SAH-RT SYLVIAN	SAME	DECREASE	CONS	-	NO	5
119	THIYAGU	55	M	12875	RTA	15	4	SAH-TENTORIUM	DECREASE	SAME	CONS	-	NO	5
120	MANOHARI	26	F	12876	RTA	11	6	SDH-RT FTP	DEC	SAME	CONS	-	NO	5
121	NEELAKANDAM	38	M	12879	RTA	13	4	EMP FRAC,RT TEMP CONTUSION,LT TE	DECREASE	SAME	CONS	-	NO	5
122	ARULRAJ	55	M	12881	FALL	14	5	SDH-RT FTP	DECREASE	DECREASE	CONS	-	NO	5
123	AYAPPAN	33	M	12885	RTA	11	4	IVH-OCCIPITAL HORN	SAME	DECREASE	CONS	-	NO	5
124	MANIKAVASAM	55	M	12887	RTA	13	6	CONTUSION RT SYLVIAN	SAME	SAME	CONS	-	NO	5
125	ANU	22	F	12900	RTA	11	4	MULTIPLE-LT FRONT FRAC WITH EDH	DECREASE	SAME	CONS	-	NO	5
126	ELANGO	37	M	12908	RTA	13	14	SDH-LT FTP	INCREASE	NT		operated	YES-SURG	5
127	SEKAR	44	M	13006	RTA	11	6	.E-RT FR FRAC,RT FR CON,CSF RHINOR	SAME	SAME	CONS	-	NO	5
128	JEGANATHAN	39	M	13008	RTA	14	6	CONTUSION RT FRONTAL	SAME	SAME	CONS	-	NO	5
129	MEGHA	18	F	13009	RTA	13	8	CONTUSION-RT PARIETAL	INCREASE	SAME	CONS	-	NO	5
130	MURUGAN	28	M	13012	RTA	13	5	SAH-TENTORIAL	SAME	SAME	CONS	-	NO	5
131	SANGAVI	22	F	13014	RTA	15	6	CONTUSION-RT FRONTAL	DECREASE	SAME	CONS	-	NO	5

132	THANGARATHI	26	F	13016	RTA	14	6	CONTUSION RT OCCIPITAL	SAME	SAME	CONS	-	NO	5
133	THIRUPATHI	42	M	13028	ASSAULT	13	4	MULTIPLE-LT FRONT FRAC WITH EDH	DECREASE	SAME	CONS	-	NO	5
134	GUNASEELAN	34	M	13031	RTA	14	6	MULTIPLE-RT TEMP FRAC WITH EDH	SAME	SAME	CONS	-	NO	5
135	DILIPRAJ	33	M	13033	FALL	10	4	DAI	SAME	SAME	CONS	-	NO	5
136	LAKSMHIKANTH	26	M	13046	FALL	13	6	MULTIPLE-RT TEM CON,LT TEM FRAC,	DEC	SAME	CONS	-	NO	5
137	VISHNU PRASANNA	44	M	13051	RTA	14	6	/ULTIPLE-RT PARIETAL FRAC WITH EDI	SAME	SAME	CONS	-	NO	5
138	RANJIT	21	M	13055	RTA	13	4	:MP FRAC,RT TEMP CONTUSION,LT TE	DECREASE	SAME	CONS	-	NO	5
139	MEENAKUMARI	33	F	13092	RTA	14	4	SDH-RT FTP	SAME	SAME	CONS	-	NO	5
140	VARUN	19	M	13112	RTA	14	8	EDH-LT PARIETAL	SAME	INCREASE		operated	YES-SURG	5
141	CHIRANJEEVI	23	M	13120	RTA	14	6	SAH-RT SYLVIAN	SAME	DECREASE	CONS	-	NO	5
142	BIJUDAS	34	M	13117	RTA	13	4	SDH-RT FTP	DECREASE	SAME	CONS	-	NO	5
143	KARTHIGEYAN	24	M	13133	RTA	14	4	CONTUSION-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
144	BALU	39	M	13137	FALL	14	6	CONTUSION-RT FRONTAL	DECREASE	SAME	CONS	-	NO	5
145	DHANDAYUTHAPANI	32	M	13139	RTA	15	5	CONTUSION RT PARIETAL	SAME	SAME	CONS	-	NO	5
146	MUTHU	66	M	13140	RTA	15	6	CONTUSION-RT TEMPORAL	DECREASE	DECREASE	CONS	-	NO	5
147	SRINIVASAN	66	M	13147	FALL	14	4	EDH-RT FRONTAL	SAME	SAME	CONS	-	NO	5
148	VENUGOPAL	40	M	13149	RTA	11	6	CONTUSION-LT FRONTAL	INCREASE	NT		operated	YES-SURG	4
149	ANBU	33	M	13155	RTA	13	4	:MP FRAC,RT TEMP CONTUSION,LT TE	DECREASE	SAME	CONS	-	NO	5
150	MANOHARAN	18	M	13169	RTA	15	5	CONTUSION LT TEMPORAL	SAME	SAME	CONS	-	NO	5
151	UDAYAKUMAR	33	M	13177	RTA	15	5	FRACTURE-LT TEMPORAL	SAME	SAME	CONS	-	NO	5
152	RAJU	38	M	13182	RTA	12	4	MULTIPLE-RT TEMP FRAC WITH EDH	SAME	DECREASE	CONS	-	NO	5
153	KARUPAIAH	35	M	13188	ASSAULT	12	4	MULTIPLE-RT FRONT FRAC WITH EDH	SAME	DECREASE	CONS	-	NO	5
154	KUPPURAJ	38	M	13190	FALL	13	6	CONTUSION LT TEMPORAL	SAME	SAME	CONS	-	NO	5
155	HUSSAIN	38	M	13193	RTA	11	6	CONTUSION-RT PARIETAL	INCREASE	SAME	CONS	-	YES-MED	5
156	MURUGAN	42	M	13195	RTA	14	2	:MP FRAC,RT TEMP CONTUSION,LT TE	DECREASE	SAME	CONS	-	NO	5
157	THANGARAJ	35	M	13199	RTA	13	4	SAH-TENTORIUM	SAME	DECREASE	CONS	-	NO	5
158	CHINNAYA	45	M	13210	RTA	9	3	SDH-RT FTP	DECREASE	SAME	CONS	-	NO	4
159	MARAGATHAM	55	F	13224	RTA	12	6	CONTUSION LT PERISYLVIAN	SAME	SAME	CONS	-	NO	5
160	SANGAYA	66	M	132226	RTA	13	5	DAI	SAME	SAME	CONS	-	NO	5
161	JACOB	62	M	13238	RTA	12	6	ICH-RT CEREBELLAR	INCREASE	NT		operated	YES-SURG	4
162	ABDUL KARIM	77	M	13240	RTA	10	5	IPLE-RT FRONTAL FRAC WITH PC,RT FR	SAME	SAME	CONS	-	NO	5
163	PARKAVI	31	F	13241	FALL	12	5	SDH-LT FTP	SAME	SAME	CONS	-	NO	5
164	SANTOSH	33	M	13930	RTA	14	4	CONTUSION-LT FRONTAL	DECREASE	DECREASE	CONS	-	NO	5

165	RAMESH	36	M	13244	RTA	14	8	CONTUSION-RT TEMPORAL	SAME	DECREASE	CONS	-	NO	5
166	PRABAKAR	34	M	13247	RTA	15	4	MULTIPLE-LT FRONT FRAC WITH EDH	DECREASE	SAME	CONS	-	NO	5
167	VINAYAGA MOORTHY	24	M	13250	RTA	15	6	CONTUSION LT FRONTAL	SAME	SAME	CONS	-	NO	5
168	ASHOK	24	M	13353	RTA	15	6	CONTUSION-RT FRONTAL	DECREASE	SAME	CONS	-	NO	5
169	RAGUPATHI	41	M	13359	RTA	13	4	SDH-LT FTP	SAME	SAME	CONS	-	NO	5
170	VISHALAKSHI	32	F	13365	RTA	15	14	CONTUSION-RT FRONTAL	SAME	DECREASE	CONS	-	NO	5
171	SIVAKUMAR	29	M	13376	RTA	11	6	CONTUSION LT TEMPORAL	SAME	SAME	CONS	-	NO	5
172	VASANTHA	39	F	13389	RTA	13	7	IULTIPLE-LT FR CONT,RT OCC FRACTUI	INCREASE	SAME	CONS	-	YES-MED	5
173	DHINAKAR	38	M	13391	RTA	14	6	SAH-RT SYLVIAN	SAME	DECREASE	CONS	-	NO	5
174	LAWRENCE	29	M	13395	RTA	10	5	E-RT FRONTAL FRAC WITH EDH ,LT FR	SAME	SAME	CONS	-	NO	5
175	VISHWA	24	M	13398	RTA	14	5	FRACTURE-LT TEMPORAL	SAME	SAME	CONS	-	NO	5
176	PANDIAN	66	M	13402	RTA	12	6	CONTUSION LT TEMPORAL	SAME	SAME	CONS	-	NO	5
177	MANIKANDAN	43	M	13404	RTA	11	4	SDH-RT FTP	INCREASE	NT	-	operated	YES-SURG	4
178	JOTHI	33	M	13406	RTA	13	3	:MP FRAC,RT TEMP CONTUSION,LT TE	DECREASE	SAME	CONS	-	NO	5
179	DHARMAR	32	M	13409	RTA	12	4	SDH-RT FTP	DECREASE	SAME	CONS	-	NO	4
180	SURAJ	24	M	13411	RTA	14	6	CONTUSION-RT FRONTAL	DECREASE	SAME	CONS	-	NO	5
181	MAHESWARAN	75	M	13419	RTA	12	4	DAI	SAME	SAME	CONS	-	NO	5
182	SARAVANAN	26	M	13421	RTA	14	6	CONTUSION LT FRONTAL	SAME	SAME	CONS	-	NO	5
183	jegannath	32	m	13423	RTA	13	6	RT SYLVIAN SAH	DECREASE	SAME	CONS	-	NO	5
184	MUTHUKUMAR	23	M	13457	RTA	15	6	CONTUSION LT FRONTAL	SAME	SAME	CONS	-	NO	5
185	LAWRENCE	33	M	13460	ASSAULT	13	4	FRACTURE-RT TEMPORAL	SAME	SAME	CONS	-	NO	5
186	SURESH	22	M	13467	RTA	15	8	CONTUSION-RT TEMPORAL	SAME	DECREASE	CONS	-	NO	5
187	VIMALA	33	F	13482	RTA	13	6	/IULTIPLE-RT PARIETAL FRAC WITH EDI	SAME	SAME	CONS	-	NO	5
188	ROOPAN	28	M	13492	RTA	13	6	CONTUSION-LT FRONTAL	INCREASE	SAME	CONS	-	YES-MED	5
189	DAVANATHAN	23	M	13493	RTA	15	4	:MP FRAC,RT TEMP CONTUSION,LT TE	DECREASE	SAME	CONS	-	NO	5
190	EESHWAR	41	M	13495	RTA	13	4	SDH-RT FTP	DECREASE	SAME	CONS	-	NO	4
191	KALIAPPAN	34	M	13516	RTA	15	5	CONTUSION -CEREBELLUM	SAME	SAME	CONS	-	NO	5
192	SIVANESHAN	38	M	13521	RTA	15	8	CONT-LT PARIETAL	DECREASE	DECREASE	CONS	-	NO	5
193	PRABUDEVA	23	M	13576	RTA	11	6	SDH-LT FTP	SAME	SAME	CONS	-	NO	5
194	SRINIVASAN	66	M	13580	FALL	11	4	CONTUSION -It TEMPORAL	SAME	SAME	CONS	-	NO	5
195	VISWANATHAN	55	M	13587	RTA	12	5	EDH-LT PARIETAL	SAME	DECREASE	CONS	-	NO	5
196	PRAKASH	26	M	13594	RTA	13	6	NORMAL	EDH-RT TEMP	INCREASE	-	operated	YES-SURG	5
197	RAJ	33	M	13596	RTA	13	4	VIULTIPLE-OCC FRAC,BIFRONTAL CON	DECREASE	SAME	CONS	-	NO	5

198	MITHUN	44	M	13599	RTA	15	3	SAH-TENTORIUM	DECREASE	DECREASE	CONS	-	NO	5
199	KALI	34	M	136O1	RTA	15	8	CONTUSION-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
200	MARUDAMUTHU	24	M	13606	RTA	13	6	CONTUSION -LT FRONTAL	SAME	SAME	CONS	-	NO	5
101	PRABAKAR	25	M	13608	FALL	11	4	SAH-RT SYLVIAN	SAME	DECREASE	CONS	-	NO	5
202	NITISH	32	M	13611	ASSAULT	13	4	NORMAL	con-rt fr	same	cons	-	YES-MED	5
203	SANJAY	33	M	13613	RTA	15	5	:MP FRAC,RT TEMP CONTUSION,LT TE	DECREASE	SAME	CONS	-	NO	5
204	DURAI	26	M	13614	RTA	14	4	SDH-RT FTP	DECREASE	SAME	CONS	-	NO	4
205	SELVARAJ	34	M	13615	RTA	14	6	CONTUSION -LT FRONTAL	SAME	SAME	CONS	-	NO	5
206	ROOPESH	22	M	13616	RTA	15	14	CONTUSION-RT PARIETAL	SAME	DECREASE	CONS	-	NO	5
207	MANJU	28	F	13617	RTA	13	6	TENTORIAL SAH	DECREASE	DECREASE	CONS	-	NO	5
208	SETHU	27	M	13618	RTA	15	4	CONTUSION -RT FRONTAL	SAME	SAME	CONS	-	NO	5
209	RAMYASRI	22	F	13619	FALL	15	6	FRACTURE-RT TEMPORAL	SAME	SAME	CONS	-	NO	5
210	GOPINATH	38	M	13621	RTA	12	4	CONTUSION -LT TEMPORAL	SAME	SAME	CONS	-	NO	5
211	SIVANESH	33	M	13622	RTA	15	8	CONT-LT PARIETAL	SAME	DECREASE	CONS	-	NO	5
212	VIKRAM	27	M	13624	RTA	12	4	SDH-LT FTP	SAME	SAME	CONS	-	NO	5
213	BALA	36	M	13626	RTA	15	6	CONTUSION-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
214	PANNEERSELVAM	36	M	13628	FALL	9	5	DAI	SAME	SAME	CONS	-	NO	5
215	ELUMALAI	35	M	13629	FALL	12	6	CONTUSION-RT FRONTAL	INCREASE	SAME	CONS	-	YES-MED	4
216	SANMUGAM	44	M	13631	RTA	14	4	MP FRAC,RT TEMP CONTUSION,LT FR(	DECREASE	SAME	CONS	-	NO	5
217	GOKUL RAJ	27	M	13637	RTA	14	5	CONTUSION -LT FRONTAL	SAME	SAME	CONS	-	NO	5
218	KALPANA	64	F	13639	RTA	13	3	ICH-RT FRONTAL	DECREASE	SAME	CONS	-	NO	5
219	SASIKUMAR	28	M	13640	RTA	13	4	.E-RT FR FRAC,RT FR CON,CSF RHINOR	SAME	SAME	CONS	-	NO	5
220	PRASANTH	24	M	13642	RTA	14	4	EDH-LT PARIETAL	SAME	DECREASE	CONS	-	NO	5
221	VEERAMANI	37	M	13647	RTA	15	8	CONTUSION -LT FRONTAL	SAME	SAME	CONS	-	NO	5
222	KRISHNAN	26	M	13650	RTA	13	6	MULTIPLE-RT FRONT FRAC WITH EDH	SAME	DECREASE	CONS	-	NO	5
223	ELANGOVAN	28	M	13655	RTA	13	6	.E-RT TEM CONT,RT TEM FRAC,LT SYL\	DEC	SAME	CONS	-	NO	5
224	FAROOK	34	M	13657	RTA	14	3	SDH-RT FTP	SAME	DECREASE	CONS	-	NO	4
225	KAVYA	19	F	13669	RTA	13	2	/ULTIPLE-LT FRONTAL FRAC WITH EDH	SAME	SAME	CONS	-	NO	5
226	SARANYA	22	F	13670	FALL	13	3	SAH-TENTORIUM	DECREASE	SAME	CONS	-	NO	5
227	DINESH	34	M	13677	RTA	12	4	VIULTIPLE-OCC FRAC,BIFRONTAL CON	SAME	DECREASE	CONS	-	NO	5
228	PRABHU	21	M	13680	RTA	15	4	CONTUSION-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
229	PRAMOTH	22	M	13687	RTA	9	4	CONTUSION -RT FRONTAL	CON-BIFRONTAL	SAME	CONS	-	YES-MED	4
230	VENUGOPAL	44	M	13689	RTA	13	5	:MP FRAC,RT TEMP CONTUSION,LT TE	DECREASE	SAME	CONS	-	NO	5

231	MANIAN	33	M	13690	RTA	13	4	MP FRAC,RT TEMP CONTUSION,LT FRC	DECREASE	SAME	CONS	-	NO	5
232	RAJA	26	M	13691	RTA	15	8	CONT-LT PARIETAL	DECREASE	DECREASE	CONS	-	NO	5
233	GANAPATHI	56	M	13694	FALL	11	3	SDH-RT FTP	SAME	DECREASE	CONS	-	NO	4
234	MOORTHY	35	M	13723	RTA	15	4	SAH-TENTORIUM	DECREASE	SAME	CONS	-	NO	5
235	BASKAR	34	M	13735	RTA	14	4	EDH-LT PARIETAL	SAME	DECREASE	CONS	-	NO	5
236	CHANDRU	22	M	13779	RTA	12	4	/ULTIPLE-RT PARIETAL FRAC WITH EDI	SAME	SAME	CONS	-	NO	5
237	RAGUPATHY	26	M	13789	RTA	12	6	MULTIPLE-RT FR CON,LT TEMP CON	INCREASE	INCREASE	CONS	-	YES-MED	5
238	ALAGAR	28	M	13798	RTA	13	4	CONTUSION -LT FRONTAL	SAME	SAME	CONS	-	NO	5
239	NITHYANANDAN	22	M	13805	FALL	14	4	CONTUSION -LT FRONTAL	SAME	SAME	CONS	-	NO	5
240	BALAJEE	35	M	13807	RTA	15	6	CONTUSION-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
241	GOWTHAM	33	M	13808	RTA	15	12	CONTUSION -RT FRONTAL	SAME	SAME	CONS	-	NO	5
242	SAKIBALI	46	M	13809	RTA	12	6	SDH-LT FTP	INCREASE	NT	-	operated	YES-SURG	5
243	JERRY	77	M	13813	RTA	11	4	SAH-BASAL CISTERN	SAME	DECREASE	CONS	-	NO	4
244	HARI	42	M	13822	RTA	15	6	SDH-RT FTP	DECREASE	SAME	CONS	-	NO	4
245	ROJA	23	F	13827	FALL	14	8	/ULTIPLE-RT PARIETAL FRAC WITH EDI	SAME	SAME	CONS	-	NO	5
246	GUNA	55	M	13829	ASSAULT	13	4	CONTUSION-RT FRONTAL	DECREASE	SAME	CONS	-	NO	5
247	THANGAKANNU	66	M	13835	RTA	14	6	/ULTIPLE-LT FRONTAL FRAC WITH EDH	SAME	SAME	CONS	-	NO	5
248	RAMAYEE	78	F	13840	FALL	13	5	ICH-LT FRONTAL	DECREASE	SAME	CONS	-	NO	5
249	DEVI	40	F	13842	RTA	13	4	MULTIPLE-RT TEMP FRAC WITH EDH	SAME	DECREASE	CONS	-	NO	5
250	MARIMUTHU	24	M	13844	RTA	15	6	CONTUSION -RT FRONTAL	SAME	SAME	CONS	-	NO	5
251	MAHESH	56	M	13846	RTA	13	8	NORMAL	EDH -RT TEMP	SAME	CONS	-	NO	5
252	PRASANTH	34	M	13856	RTA	13	7	CONTUSION RT TEMPORAL	SAME	SAME	CONS	-	NO	5
253	KRISHNAKUMAR	34	M	13862	RTA	13	4	CONTUSION-RT FRONTAL	DECREASE	SAME	CONS	-	NO	5
254	SHANKAR	38	M	13876	RTA	11	6	CONTUSION -LT TEMPORAL	SAME	SAME	CONS	-	NO	5
255	DANUSKODI	34	M	13878	RTA	12	5	E-RT FRONTAL FRAC WITH EDH ,LT FR	SAME	SAME	CONS	-	NO	5
256	RAVI	35	M	13881	RTA	12	4	CONTUSION-RT PARIETAL	DECREASE	SAME	CONS	-	NO	5
257	PANDI	35	M	13890	RTA	15	6	CONTUSION-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
258	MANORMANI	32	F	13891	ASSAULT	15	4	FRACTURE-RT TEMPORAL	SAME	SAME	CONS	-	NO	5
259	SHANKAR	29	M	13892	RTA	13	4	SAH-TENTORIUM	DECREASE	SAME	CONS	-	NO	5
260	KRISHNAMOORTHY	67	M	13896	FALL	12	6	SDH-RT TP	TP SDH,LT TEM C	SAME	CONS	-	YES-MED	4
261	BIJU	33	M	13899	RTA	14	4	MULTIPLE-OCC FRAC,BIFRONTAL CON	DECREASE	SAME	CONS	-	NO	5
262	JEGAN	34	M	13906	RTA	14	4	SDH-RT FTP	DECREASE	SAME	CONS	-	NO	4
263	VALLAVARAYAN	29	M	13919	RTA	12	3	CONTUSION-RT FRONTAL	DECREASE	SAME	CONS	-	NO	5

264	RAGUPATHY	37	M	13923	RTA	15	2	EDH-LT PARIETAL	DECREASE	DECREASE	CONS	-	NO	5
265	MADHANARAJ	22	M	13942	RTA	13	6	CONTUSION -RT TEMPORAL	SAME	SAME	CONS	-	NO	5
266	KANNAKI	32	F	13943	RTA	15	8	CONT-LT PARIETAL	DECREASE	SAME	CONS	-	NO	5
267	VIGNESH	22	M	13945	RTA	13	4	MP FRAC,RT TEMP CONTUSION,LT FRC	DECREASE	SAME	CONS	-	NO	5
268	VINOTH	26	M	13989	RTA	9	4	SAH-BASAL CISTERN	SAME	DECREASE	CONS	-	NO	4
269	MANSOOR	17	M	14002	FALL	15	6	CONTUSION-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
270	KANNIAH	23	M	14006	RTA	14	4	SDH-LT FTP	DECREASE	SAME	CONS	-	NO	4
271	STELLA	46	F	14008	FALL	10	6	CONTUSION- RT TEMP	INCREASE	SAME	CONS	-	YES-MED	4
272	MARIMUTHU	39	M	14013	RTA	15	5	CONTUSION RT PARIETAL	SAME	SAME	CONS	-	NO	5
273	CHINNAYA	46	M	14019	RTA	13	4	CONTUSION-RT FRONTAL	DECREASE	SAME	CONS	-	NO	5
274	NEELAKANDAM	26	M	14020	RTA	15	5	CONTUSION RT OCCIPITAL	SAME	SAME	CONS	-	NO	5
275	VASUDEVAN	67	M	14122	RTA	13	5	CONTUSION RT TEMPORAL	SAME	SAME	CONS	-	NO	5
276	KARUNAKARAN	17	M	14129	RTA	13	6	EDH-LT PARIETAL	INCREASE	NT	-	operated	YES-SURG	5
277	VARUN	22	M	14131	RTA	15	4	MULTIPLE-OCC FRAC,BIFRONTAL CONT	SAME	DECREASE	CONS	-	NO	5
278	MANICAM	46	M	14137	RTA	14	8	MULTIPLE-RT PARIETAL FRAC WITH EDI	SAME	SAME	CONS	-	NO	5
279	VEDAVALLI	41	F	14140	RTA	15	6	FRACTURE-RT TEMPORAL	SAME	SAME	CONS	-	NO	5
280	NAGARAJ	33	M	14149	RTA	15	6	CONTUSION-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
281	THANMARAN	31	M	14151	RTA	13	4	MP FRAC,RT TEMP CONTUSION,LT FRC	DECREASE	SAME	CONS	-	NO	5
282	LALBAHADUR	34	M	14162	RTA	11	4	SDH-LT FTP	DECREASE	SAME	CONS	-	NO	4
283	ASHOK	24	M	14170	RTA	14	4	EDH-LT PARIETAL	DECREASE	SAME	CONS	-	NO	5
284	BABU	36	M	14177	RTA	13	6	ICH-RT FRONTAL	RT FR,CON RT T	SAME	CONS	-	YES-MED	5
285	PANDIARAJAN	33	M	14179	RTA	13	6	LE-RT FR FRAC,RT FR CON,CSF RHINOR	SAME	SAME	CONS	-	NO	5
286	SIVANESHAN	30	M	14180	RTA	14	4	MULTIPLE-RT TEMP FRAC WITH EDH	SAME	SAME	CONS	-	NO	5
287	RAMYASRI	32	F	14182	FALL	14	5	CONTUSION-RT FRONTAL	SAME	DECREASE	CONS	-	NO	5
288	VISHNU KUMAR	33	M	14188	RTA	13	4	PLE-RT TEMP FRAC WITH EDH,CSF OTC	SAME	SAME	CONS	-	NO	5
289	MANIKANDAN	32	M	14189	RTA	15	4	CONT-LT PARIETAL	DECREASE	SAME	CONS	-	NO	5
290	SIVAKUMAR	32	M	14191	RTA	14	4	MP FRAC,RT TEMP CONTUSION,LT FRC	DECREASE	DECREASE	CONS	-	NO	5
291	MEENA	55	F	14192	FALL	12	6	SDH-LT FTP	DECREASE	SAME	CONS	-	NO	4
292	SUNDARAM	33	M	14194	RTA	15	5	FRACTURE-RT TEMPORAL	SAME	SAME	CONS	-	NO	5
293	DAVID	37	M	14195	ASSAULT	14	6	CONTUSION-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
294	KARTIGEYAN	23	M	14209	RTA	12	4	IPLE-RT FRONTAL FRAC WITH PC,RT FR	SAME	SAME	CONS	-	NO	5
295	MAUSYANAM	66	M	14211	RTA	13	5	CONTUSION-LT FRONTAL	DECREASE	SAME	CONS	-	NO	5
296	RAMANATHAN	34	M	14240	RTA	14	2	MULTIPLE-LT FRONTAL FRAC WITH EDH	SAME	SAME	CONS	-	NO	5

297	RAJEEV	35	M	14255	RTA	15	7	EDH-RT PARIETAL	DECREASE	SAME	CONS	-	NO	5
298	RAMESH	24	M	14261	RTA	15	5	EDH-RT FRONTAL	SAME	SAME	CONS	-	NO	5
299	BADRINATH	23	M	14265	RTA	15	4	TIPLE-RT TEMP FRAC,RT TEMP CONTU	DECREASE	DECREASE	CONS	-	NO	5
300	PARTIBAN	42	M	14267	RTA	11	6	NORMAL	USION-LT TEMP	NT	-	operated	YES-SURG	4
301	MARAN	38	M	14269	RTA	14	6	MULTIPLE-OCC FRAC,BIFRONTAL CON	SAME	DECREASE	CONS	-	NO	5
302	JOHN	42	M	14270	RTA	15	4	CONTUSION-LT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
303	SURYA	33	M	14272	RTA	15	4	TIPLE-RT TEMP FRAC,RT TEMP CONTU	DECREASE	SAME	CONS	-	NO	5
304	DANUSH	22	M	14275	RTA	14	5	MP FRAC,RT TEMP CONTUSION,LT FRC	SAME	DECREASE	CONS	-	NO	5
305	JACOB	19	M	14280	ASSAULT	15	3	CONTUSION-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
306	NAGAJOTHI	45	F	14285	RTA	12	4	SDH-LT FTP	DECREASE	SAME	CONS	-	NO	4
307	PUSPHA	72	F	14290	RTA	11	6	SDH-RT FTP	SAME	SAME	CONS	-	NO	5
308	SEKAR	29	M	14297	FALL	15	4	CON-RT TEMP	DECREASE	SAME	CONS	-	NO	5
309	CHINNU	43	M	14299	RTA	14	4	TIPLE-RT TEMP FRAC,RT TEMP CONTU	DECREASE	SAME	CONS	-	NO	5
310	KANAGASABAI	43	M	14322	RTA	14	6	CONTUSION-RT TEMPORAL	SAME	DECREASE	CONS	-	NO	5
311	MANIKAM	28	M	14362	RTA	15	4	FRACTURE-RT TEMPORAL	SAME	SAME	CONS	-	NO	5
312	RENGARAJAN	35	M	14376	RTA	11	4	CONTUSION-RT FRONTAL	DECREASE	SAME	CONS	-	NO	5
313	ARUNKUMAR	33	M	14379	RTA	13	6	MULTIPLE-LT FRONT FRAC WITH EDH	DECREASE	SAME	CONS	-	NO	5
314	VIDHYA	32	f	14380	RTA	14	4	EDH-RT TEMPORAL	SAME	SAME	CONS	-	NO	5
315	JANAKI	22	F	14386	FALL	14	4	MULTIPLE-OCC FRAC,BIFRONTAL CON	DECREASE	SAME	CONS	-	NO	5
316	KANAGARAJ	35	M	14388	RTA	15	4	CONTUSION-LT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
317	MARTIN	56	M	14392	RTA	13	7	PNEUMOCEPHALUS-BIFRONTAL	INCREASE	NT	-	operated	YES-SURG	5
318	KANNAN	24	M	14393	FALL	14	5	MULTIPLE-OCC FRAC,BIFRONTAL CON	DECREASE	SAME	CONS	-	NO	5
319	PRAKASH	23	M	14399	RTA	13	4	IVH-RT OCCIPITAL HORN	SAME	SAME	CONS	-	NO	5
320	BOMMI	38	F	144534	RTA	15	6	MULTIPLE-RT TEMP FRAC WITH EDH	SAME	DECREASE	CONS	-	NO	5
321	RAJATHI	44	F	14404	RTA	14	6	MULTIPLE-RT TEMP FRAC WITH EDH	DECREASE	SAME	CONS	-	NO	5
322	MANIVANNAN	42	M	14413	RTA	15	4	TIPLE-RT TEMP FRAC,RT TEMP CONTU	DECREASE	SAME	CONS	-	NO	5
323	ANWAR	33	M	14415	RTA	15	4	CONTUSION-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
324	ROJA	19	M	14390	RTA	13	5	MP FRAC,RT TEMP CONTUSION,LT FRC	DECREASE	SAME	CONS	-	NO	5
325	NAGESH	34	M	14472	RTA	13	5	MP FRAC,RT TEMP CONTUSION,LT FRC	DECREASE	SAME	CONS	-	NO	5
326	AROKYADAS	55	M	14489	FALL	11	4	CONTUSION-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
327	SMITHA GUPTA	45	F	14492	FALL	12	4	DAI	SAME	SAME	CONS	-	NO	5
328	MANGAYARKARASI	36	F	14494	RTA	13	4	CONTUSION-RT TEMPORAL	SAME	DECREASE	CONS	-	NO	5
329	VINAYKUMAR	25	M	14496	ASSAULT	15	4	FRACTURE-LT PARIETAL	SAME	SAME	CONS	-	NO	5

330	PALANI	72	M	14498	RTA	12	6	'IPLE-RT FR CON,LT OCC FRAC,LT TEMI	INCREASE	SAME	CONS	-	YES-MED	5
331	SANGEETHA	24	F	14500	FALL	14	5	VIULTIPLE-OCC FRAC,BIFRONTAL CON	DECREASE	SAME	CONS	-	NO	5
332	VIJAYAKANTH	34	M	14508	RTA	15	4	FRACTURE-RT FRONTAL	SAME	SAME	CONS	-	NO	5
333	KANAGAVALLI	78	F	14511	FALL	11	4	IVH-OCCIPITAL HORN	SAME	DECREASE	CONS	-	NO	5
334	PANEERSELVAM	45	M	14516	RTA	14	6	CONTUSION-LT FRONTAL	DECREASE	SAME	CONS	-	NO	5
335	AVANEETHA KRISHNA	50	M	14671	RTA	9	6	CONTUSION-RT FRONTAL	INCREASE	NT	-	operated	YES-SURGICAL	4
336	GANDHI	29	M	14522	ASSAULT	15	6	CON-RT TEMP	DECREASE	SAME	CONS	-	NO	5
337	ZULPIKAR	44	M	14527	RTA	13	4	MP FRAC,RT TEMP CONTUSION,LT FR(	DECREASE	SAME	CONS	-	NO	5
338	MANI	34	M	14529	RTA	15	3	CONTUSION-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
339	VINEETHA	23	F	14531	RTA	14	3	CONTUSION-RT FRONTAL	DECREASE	SAME	CONS	-	NO	5
340	SINGARAM	33	M	14536	RTA	15	4	TIPLE-RT TEMP FRAC,RT TEMP CONTU	DECREASE	SAME	CONS	-	NO	5
341	KARUPPAN	38	M	14579	RTA	12	6	ICH-LT FRONTAL	DECREASE	DECREASE	CONS	-	NO	4
342	RENGANATHAN	23	M	14584	RTA	15	4	EDH-RT PARIETAL	DECREASE	SAME	CONS	-	NO	5
343	RAMKUMAR	32	M	14592	RTA	12	3	SAH-BASAL CISTERN	DECREASE	SAME	CONS	-	NO	5
344	PREMJI	36	M	14610	RTA	14	4	SDH-LT FTP	DECEASE	DECREASE	CONS	-	NO	5
345	SASIKUMAR	30	M	14631	RTA	13	6	EDH-RT FRONTAL	INCREASE	SAME	CONS	-	NO	5
346	ANOOP	35	M	14393	FALL	14	5	VIULTIPLE-OCC FRAC,BIFRONTAL CON	DECREASE	SAME	CONS	-	NO	5
347	THALAPATHI	34	M	14640	RTA	13	6	MP FRAC,RT TEMP CONTUSION,LT FR(	DECREASE	SAME	CONS	-	NO	5
348	CHINNA	24	M	14643	RTA	15	4	CONTUSION-RT TEMPORAL	DECREASE	SAME	CONS	-	NO	5
349	THOMAS	42	M	14646	RTA	13	7	NORMAL	EDH-RT TEMP	SAME	CONS	-	NO	5
350	OVIYA	23	F	14518	RTA	13	3	SDH-LT FTP	SAME	DECREASE	CONS	-	NO	5

ABBREVATIONS USED IN MASTER CHART

1. S.No-serial number

2. MIN-madras institute of neurology

3. MOI-mode of injury
   RTA-road traffic accident

4. CT findings
   - Lt-left
   - Rt-right
   - Con-contusion
   - FTP-fronto tempero parietal
   - Temp-temporal
   - Fron-frontal
   - Frac-fracture
   - DAI-diffuse axonal injury

5. cons-conservative

6. MGT-management

7. MED-medical

8. Surg-surgical

APPENDIX

ஆராய்ச்சி ஒப்புதல் கடிதம்

ஆராய்ச்சி தலைப்பு : "‘ **ROLE OF ROUTINE FOLLOW-UP CT BRAIN AT 24hrs AND 48hrs IN HEAD INJURY PATIENTS**”” பற்றிய ஆய்வு

பெயர் : வயது / பால் : **தேதி :**

ஆராய்ச்சி சேர்க்கை எண் :

- ராஜீவ் காந்தி அரசு மருத்துவக்கல்லூரி மற்றும் அரசு பொது மருத்துவமனையின் நரம்பியல் அறுவை சிகிச்சைத் துறையில் "‘‘ **ROLE OF ROUTINE FOLLOW-UP CT BRAIN AT 24hrs AND 48hrs IN HEAD INJURY PATIENTS**”” பற்றிய ஆய்வு நடைபெறுகிறது என்பதை அறிந்து கொண்டேன்
- சிடி ஸ்கேன் அடிப்படையில் இந்த ஆய்வு நடைபெறுகிறது என்பதையும் மேலும் அறுவை சிகிச்சையின் போது நேரடியாக பார்க்கப்படுவதை வைத்தும் ஆய்வு நடைபெறுகிறது என்பதையும் அறிந்து கொண்டேன்
- இவ்வாய்வில் கலந்து கொள்பவர்களின் சொந்த தகவல்கள் ரகசியமாக பாதுக்காகபடும் என்பதையும் இந்த ஆய்வின் முடிவுகளை பிரசுரிக்குபோது அல்லது வெளியிடும்போதோ தங்களின் எனது தகவல்கள் ஏதும் வெளியிடபடாது என்பதையும் அறிந்து கொண்டேன்
- இந்த ஆராய்ச்சியிலிருந்து எந்த நேரமும் பின் வாங்கலாம் என்றும், அதனால் எந்த பாதிப்பும் எற்படாது என்பதையும் அறிந்து கொண்டேன்
- இந்த ஆய்வில் பங்குபெற அல்லது விலகிக்கொள்ள எனக்கு முழு சுதந்திரம் உண்டு என்பதையும், இந்த ஆய்வில் இருந்து நான் விலகிகொண்டாலும் எனக்கு கிடைக்கவேண்டிய சிகிச்சை தொடர்ந்து கிடைக்கும் என்பதையும் அறிந்து கொண்டேன்
- இந்த ஆராய்ச்சியின் விவரங்களும், அதன் நோக்கங்களும் எனக்கு தெளிவாக விளக்கப்பட்டது. எனக்கு விளக்கப்பட்ட விவரங்களை புரிந்து கொண்டு, இந்த ஆய்வில் கலந்து கொள்ள சம்மதிக்கிறேன்
- இந்த ஆராய்ச்சியில் பிறரின் நிர்பந்தமின்றி என் சொந்த விருப்பத்தின் பேரில் தான் பங்கு பெறுகிறேன்

கையொப்பம்

INFORMED CONSENT FORM

Title of the study :"" ROLE OF ROUTINE FOLLOW-UP CT BRAIN AT 24hrs AND 48hrs IN HEAD INJURY PATIENTS""

Name of the Participant: Dr.Suresh Kumar.A

Name of the Principal (Co-Investigator): Prof.V.SundarMCh

Name of the Institution: Institute of Neurology, MadrasMedicalCollege and RajivGandhiGovernment GeneralHospital, Chennai

Name and address of the sponsor / agency (ies) (if any): None**.**

Documentation of the informed consent

I _____ have read the information in this form (or it has been read to me). I was free to ask any questions and they have been answered. I am over 18 years of age and, exercising my free power of choice, hereby give my consent to be included as a participant in "A Study of Microsurgical Anatomy of the Superior Sagittal Sinus and Draining Veins"

1. I have read and understood this consent form and the information provided to me.

2. I have had the consent document explained to me.

3. I have been explained about the nature of the study.

4. I have been explained about my rights and responsibilities by the investigator.

5. I have been informed the investigator of all the treatments I am taking or have taken in the past _____ months including any native (alternative) treatment.

6. I have been advised about the risks associated with my participation in this study.*****

7. I agree to cooperate with the investigator and I will inform him/her immediately if I suffer unusual symptoms. *****

8. I have not participated in any research study within the past _____month(s). *****

9. I have not donated blood within the past _____ months—Add if the study involves extensive blood sampling. *****

10. I am aware of the fact that I can opt out of the study at any time without having to give any reason and this will not affect my future treatment in this hospital. *****

11. I am also aware that the investigator may terminate my participation in the study at any time, for any reason, without my consent. *****

12. I hereby give permission to the investigators to release the information obtained from me as result of participation in this study to the sponsors, regulatory authorities, Govt. agencies, and IEC. I

understand that they are publicly presented.

13. I have understand that my identity will be kept confidential if my data are publicly presented

14. I have had my questions answered to my satisfaction.

15. I have decided to be in the research study.

I am aware that if I have any question during this study, I should contact the investigator. By signing

this consent form I attest that the information given in this document has been clearly explained to me and understood by me, I will be given a copy of this consent document.

For adult participants:

Name and signature / thumb impression of the participant (or legal representative if participant incompetent)

Name _____ Signature_____
Date_____

Name and Signature of impartial witness (required for illiterate patients):

Name _____ Signature_____
Date_____

Address and contact number of the impartial witness:

Name and Signature of the investigator or his representative obtaining consent:

Name _____ Signature_____
Date_____

For Children being enrolled in research:

Whether child's assent was asked: Yes / No (Tick one)

[If the answer to be above question is yes, write the following phrase:

You agree with the manner in which assent was asked for from your child and given by yourchild. You agree to have your child take part in this study].

[If answer to be above question No, give reason (s)
:_____.

Although your child did not or could not give his or her assent, you agree to your child's

participation in this study.

Name and Signature of / thumb impression of the participant's parent(s) (or legal representative)

Name _____ Signature_____
Date_____

Name _____ Signature_____
Date_____

Name and Signature of impartial witness (required for parents of participant child illiterate):

Name _____ Signature_____
Date_____

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI -3

Telephone No : 044 25305301
Fax : 044 25363970

CERTIFICATE OF APPROVAL

To
Dr.A.Suresh Kumar
PG in Neurosurgery
Madras Medical College,Chennai -3

Dear Dr.A.Suresh Kumar,

The Institutional Ethics committee of Madras Medical College, reviewed and discussed your application for approval of the proposal entitled " Role of routine follow-up CT Brain at 24 hours and 48 hours in head injury patients" No.27112012.

The following members of Ethics Committee were present in the meeting held on 01.11.2012 conducted at Madras Medical College, Chennai -3.

1. Prof. R. Nandhini MD -- Member Secretary
   Director, Instt. of Pharmacology ,MMC, Ch-3
2. Prof. Reghu MD -- Member
   Director , Inst. Of Internal Medicine, MMC, Ch-3
3. Prof. Shyamraj MD -- Member
   Director i/c , Instt. of Biochemistry , MMC, Ch-3
4. Prof. P. Karkuzhali. MD -- Member
   Prof., Instt. of Pathology, MMC, Ch-3
5. Prof. G.Muralidharan MS -- Member
   Prof of Surgery, MMC, Ch-3
6. Thiru. S. Govindsamy. BA, BL -- Lawyer

We approve the proposal to be conducted in its presented form.

Sd/ Chairman & Other Members

The Institutional Ethics Committee expects to be informed about the progress of the study, and SAE occurring in the course of the study, any changes in the protocol and patients information / informed consent and asks to be provided a copy of the final report.

R Nandhini 19/11/12
Member Secretary, Ethics Committee

preferences

Originality Report

Processed on: 23-Mar-2013 07:34 IST
ID: 312702527
Word Count: 16420
Submitted: 3

Document Viewer

value of follow up ct brain

By Suresh Kumar Arumugam
18101511 M.Ch. Neuro Surgery

Similarity Index
17%
What's this?

Similarity by Source

Internet Sources:	14%
Publications:	10%
Student Papers:	5%

exclude quoted exclude bibliography excluding matches < 12 words

mode: show highest matches together

THE TAMILNADU DR.M.G.R.MEDICAL UNIVERSITY VALUE OF ROUTINE FOLLOWUP CT BRAIN AT 24 AND 48 HOURS IN MILD AND MODERATE HEAD INJURY PATINTS

Dissertation submitted in partial fulfillment of the requirements for the degree of 56

M.Ch. Branch –II NEUROSURGERY Examination in AUGUST 2013 INSTITUTE OF NEUROLOGY MADRAS MEDICAL COLLEGE CHENNAI – 3. CERTIFICATE This is to certify that the dissertation entitled is "VALUE OF ROUTINE FOLLOWUP CT BRAIN AT 24 AND 48 HOURS IN MILD AND MODERATE HEAD INJURY PATINTS" the bonafide original work of Dr.A.SURESHKUMAR in partial fulfillment of the requirements for Branch II, M.Ch Neurosurgery, examination of THE TAMILNADU DR.M.G.R MEDICAL UNIVERSITY to be held in August 2013.The period of post graduate study and training was from August 2010 – August 2013. DEAN Madras Medical College, Rajiv Gandhi Government General Hospital, Chennai -3. PROF. K.DEIVEEGAN, MCh Professor and HOD,

1 3% match (Internet from 22-Feb-2012)
http://www.mmc.tn.gov.in

2 1% match (Internet from 24-Dec-2012)
http://www.multiwebcast.com

3 1% match (Internet from 12-Oct-2010)
http://www.nmcth.edu

4 1% match (publications)
Uri Tabori. "Repeat computed tomographic scan within 24-48 hours of admission in children with moderate and severe head trauma", Critical Care Medicine, 03/2000

5 1% match (publications)
Marjorie C. Wang. "Utility of Repeat Head